

ATTACHMENT J-5  
DELIVERY SCHEDULE

1.0 The contractor shall perform the Production effort as identified in Attachment J-1 hereof entitled "Statement of Work – Effort for External Tank Project - 5<sup>th</sup> Production Buy," to support the MAF On-Dock delivery schedule baseline as denoted in paragraph 3.0 below.

2.0 Schedule Baseline- For External Tank Effectivities ET-93, 94, 106 and ET-108 through ET-121, the MAF On-Dock deliveries support the baseline criteria reflected in paragraph 2.1 below as noted in Appendix I to this Attachment.

2.1 MAF On-Dock Delivery Schedule Development- The MAF On-Dock Delivery Dates identified in paragraph 3.0 below were developed to support the following criteria which is provided herein for reference purposes:

- Supports KSC Launch Site minimum processing of 122 days
- Maintains an inventory of four delivered External Tanks (DD-250), (i.e. one in storage at MAF and three in process at KSC)
- Maintains External Tank configuration (i.e. SLWT or LWT)

2.2 Schedule Baseline Changes

2.2.1 Deliveries Subsequent to Appendix I MAF On-Dock Baseline- In the event of changes to the schedule baseline as defined in paragraph 2.0 above, the contractor, at his production discretion, may deliver External Tanks at a minimum of 160 days prior to KSC Launch date to allow for management of resources and factory efficiencies. The contractor will provide prior written notification to the Contracting Officer including the required analysis demonstrating the 160-day KSC processing and the tank inventory requirement are satisfied in order to assure program commitments, as contained in paragraph 2.1 above, continue to be met.

2.2.2 Deliveries Prior to Appendix I MAF On-Dock Baseline- Should a change to the schedule baseline occur as denoted in paragraph 1.0 above, which would require delivery of an External Tank in advance of a baseline MAF On-Dock date as denoted in paragraph 3.0 below, the contract will be subject to equitable adjustment.

3.0 Baseline MAF On-Dock Delivery Schedule

<u>ITEM</u>	<u>MAF On-Dock</u>
ET-61	October 15, 1991
ET-62	January 23, 1992
ET-63	April 30, 1992
ET-64	August 4, 1992
ET-65	November 5, 1992
ET-66	February 16, 1993
ET-67	May 18, 1993
ET-68	August 16, 1993

ITEM

MAF On-Dock

ET-69	November 12, 1993
ET-70	February 22, 1994
ET-71	May 12, 1994
ET-72	July 27, 1994
ET-73	October 4, 1994
ET-74	December 6, 1994
ET-75	February 9, 1995
ET-76	April 11, 1995
ET-77	June 7, 1995
ET-78	August 4, 1995
ET-79	October 3, 1995
ET-80	November 28, 1995
ET-81	January 29, 1996
ET-82	March 21, 1996
ET-83	May 10, 1996
ET-84	July 1, 1996
ET-85	August 21, 1996
ET-86	October 11, 1996
ET-87	December 4, 1996
ET-88	January 31, 1997
ET-89	August 7, 1997
ET-90	August 28, 1997
ET-96*	September 29, 1997
ET-91**	December 24, 1997
ET-97*	March 31, 1998
ET-98*	June 23, 1998
ET-99*	July 28, 1998
ET-100*	November 27, 1998
ET-101*	December 1, 1998
ET-102*	February 2, 1999
ET-103*	March 23, 1999
ET-92**	April 20, 1999
ET-104*	June 2, 1999
ET-105*	July 16, 1999
ET-107*	October 13, 1999
ET-106*	December 23, 1999
ET-108*	February 10, 2000
ET-109*	May 12, 2000
ET-110*	July 28, 2000
ET-111*	September 28, 2000
ET-93**	November 3, 2000
ET-94**	January 18, 2001
ET-112*	March 13, 2001
ET-113*	May 2, 2001

ITEM

MAF On-Dock

ET-114\*  
ET-115\*  
ET-116\*  
ET-117\*  
ET-118\*  
ET-119\*  
ET-120\*  
ET-121\*

June 20, 2001  
September 28, 2001  
November 29, 2001  
February 6, 2002  
April 8, 2002  
June 4, 2002  
August 1, 2002  
September 30, 2002

\* DENOTES SUPER LIGHTWEIGHT EXTERNAL TANK CONFIGURATION  
\*\* DENOTES LIGHTWEIGHT EXTERNAL TANK CONFIGURATION

5.0 Other Deliverables

ITEM

DD250 DATE

Aluminum Lithium Test Article (ALTA)

December 26, 1995

End of Clause

END OF SECTION

## APPENDIX I

### Delivery Alignment with Launch Flight Manifest

Schedule Baseline				
ET	MAF On-Dock Baseline	STS	Flight Manifest Launch Date*	KSC Processing Days
106	12/23/99	102	10/19/00	293
108	02/14/00	107	01/11/01	324
109	05/12/00	104	02/08/01	264
110	07/27/00	105	03/08/01	216
111	09/07/00	106	04/19/01	216
93	10/11/00	111	10/04/01	350
94	11/14/00	NA	Stored	NA
112	01/11/01	108	05/24/01	125
113	02/09/01	109	06/21/01	124
114	04/05/01	110	08/16/01	125
115	05/14/01	112	11/01/01	163
116	08/02/01	113	01/17/02	160
117	08/30/01	114	02/14/02	160
118	10/04/01	115	03/21/02	160
119	11/14/01	116	05/16/02	175
120	12/21/01	117	06/13/02	166
121	01/31/02	118	07/18/02	160

\*Launch dates based on 12/16/99 FAWG

Modification as of 04/03/00				
ET	Revised MAF On-Dock Date	STS	Flight Manifest Launch Date**	KSC Processing Days
108	02/10/00	100	04/19/01	426
109	05/12/00	104	05/17/01	362
110	07/28/00	105	06/21/01	320
111	09/28/00	109	07/26/01	293
93	11/03/00	107	03/15/01	124
94	01/18/01	111	11/29/01	307
112	03/13/01	108	8/23/01	155
113	05/02/01	110	10/04/01	147
114	06/20/01	112	01/17/02	203
115	08/09/01	113	02/14/02	181
116	09/28/01	114	04/11/02	187
117	11/12/01	115	05/16/02	177
118	01/07/02	116	06/13/02	149
119	02/21/02	117	08/08/02	160
120	04/05/02	118	09/12/02	152
121	05/17/02	119	10/10/02	138

\*\*Launch dates based on POP 2000 Guidelines dated

ATTACHMENT J-6  
STATEMENT OF WORK  
FOR SPACE SHUTTLE SYSTEM INTEGRATION SUPPORT  
(WBS 3.6.2.1 AND 3.6.2.7)

1.0 The Contractor shall provide system technical studies and laboratory support. This support will include the necessary engineering skills, studies, materials, and equipment (except that to be provided by the Government) in performance of this effort.

1.1 The above scope shall be accomplished by issuance of NASA directed tasks in accordance with the provisions of Article G-2 - Technical Direction within the provisions of Paragraphs 3.0, 4.0, 5.0 and 6.0 of this Attachment.

1.2 Tasks are usually one year in duration and include but are not limited to:

1.2.1 - Development Studies  
- Development testing

1.2.2 - Analysis  
- Manufacturing process development  
- Quality/Inspecting process development

1.2.3 - Test Support  
• Laboratory testing and design  
• Propulsion Systems

1.2.4 - Preliminary groundwork for an Engineering Change Proposal  
(ECP)

2.0 The Contractor shall participate in system optimization studies, cost effectiveness analyses, system capability analyses and technical risk assessments as they apply to Engineering and Manufacturing Operations.

3.0 Operations and Production Activities - WBS 3.6.2.1 - The Contractor shall furnish the necessary engineering skills, materials, studies and equipment (except that to be provided by the Government) to perform research and development activity directed at resolving anomalies on issues related to the basic operation and design of the External Tank.

3.1 The total effort contemplated for the tasks defined as 600 Series Technical Directives authorized here under is ~~(6)~~ (4) directed hours. For reporting against the total directed hours, one direct hour is equivalent to \$\*\* of subcontract, computer, material, IDOD cost, travel or other direct costs and the appropriate material overheads and G&A as follows:

3.1 (continued)

600 Series Technical Directives

FISCAL YEAR	HOURS	HOURS USED	BALANCE OF HOURS AVAILABLE	CONVERSION RATE **	AUTHORIZED MODIFICATION
1989					S/A 007, 028 & 096
1990					S/A 067
1991					S/A 113
1992					S/A 188
1993					S/A 260

\*Balance of hours are rolled forward each fiscal year to be used in the next fiscal year. Therefore, the balance of hours available identified for the most current fiscal year represent total remaining hours paragraph 3.1.

4.0 System Test Activities - WBS 3.6.2.1 (900 Series TDs) - The Contractor shall furnish the necessary engineering skills, materials, studies, and equipment (except that to be provided by the Government) to perform MSFC on-site support for the coordination/ management of test planning, analysis, evaluation and preparation/conduct of ground test systems. Provide training and necessary materials as it relates to agency initiatives.

4.1 The Contractor is authorized (b)(4) equivalent man-hours for the performance of the 900 Series Technical Directive activity. The Government may however; by written notice, increase the total number of hours by exercising the options set forth below with the appropriate equitable adjustments as identified in Clause B.2 Paragraph VI:

<u>OPTION</u>	<u>PERIOD COVERED</u>	<u>NO. OF HOURS</u>	<u>EXERCISED BY</u>
1	10/1/96 - 9/30/97		S/A 393/425
2	10/1/97 - 9/30/98		S/A 434/440/484
3	10/1/98 - 9/30/99		S/A 479/495/511
4	10/1/99 - 9/30/00		S/A 528
5	10/1/00 - 8/31/01		Not exercised (See S/A 568)

4.2 The above scope shall be accomplished by issuance of NASA directed tasks in accordance with the provisions of Article G.2 - Contracting Officer's Technical Representative within the provisions of Paragraph 4.1 above. For purposes of reporting against the total direct hours, one direct hour is equivalent to \$TBD of subcontract, computer, material, IDOD cost, travel or other direct costs and the appropriate overheads and G&A. Conversion rate by Fiscal Year and uncommitted hours available for the effort defined in paragraph 4.0 above will be identified in Document MMC-ET-MA83 "Special Studies Report".

4.3 The parties hereby agree that the Contracting Officer, may by written order, increase the total number of hours authorized in Subparagraph 4.1 by issuing a Supplemental Agreement. The Target Cost identified in Section B will be adjusted by the total number of hours to be added times the following identified rates and appropriate fee adjustments:\*

PERIOD COVERED	Target Costs per Hour
10/1/95 - 9/30/96	
10/1/96 - 9/30/97	
10/1/97 - 9/30/98	
10/1/98 - 9/30/99	
10/1/99 - 9/30/00	
10/1/00 - 9/30/01	
10/1/01 - 9/30/02	

4.4 At the end of this contract, the contractor will submit a Target Cost, Target Fee and Award Fee adjustment proposal to the Contracting Officer for an adjustment to contract for the total number of unused hours determined as identified in paragraph 9.0 below. The Target Cost adjustment will be calculated by multiplying the unused hours by the appropriate period rate identified in paragraph 4.3 above.

#### 5.0 Special Development Studies (SDS's) (WBS 3.6.2.7)

5.1 Special Development Studies are for the following types of activities:

- (a) Material/Process Environmental Issues
- (b) Material/Process/Equipment Obsolescence Replacements
- (c) Resolving Unforeseen Anomalies related to the required operations and design of the ET.
- (d) Development Studies
  - Preliminary design
  - Development testing
  - Test Specimen fabrication
- (e) Analyses
  - Process development

Effort to be furnished will include the necessary skills, materials, and equipment (except that to be provided by the Government).

5.1.1 The above shall be accomplished by issuance of Technical direction for a Special Development Study activity by the External Tank Project Manager or Contracting Officer within the general scope of the basic contract and mutually agreed to by the Contractor.

5.1.2 Effective October 1, 1993 through the period of performance of the Fifth Buy Production contract, hours are included in the contract for labor and non-labor (identified in

Paragraph 5.3 below) to perform the mutually agreed to activities.

5.2 Work to be performed under this paragraph will be within the broad parameters listed above. Special Development Studies (SDS) shall be pre-coordinated between the Contractor and the Project Manager to definitize the study plan and the estimated hours required to accomplish the approved studies. Each study will contain the scope of work, period of performance desired, and such other instructions as may be necessary to properly define the desired effort.

5.3 The Contractor shall promptly commence work upon receipt and acknowledgment of a properly executed SDS by the NASA ET Project Manager and the Contractor. The Contractor shall accumulate and maintain records on a study by study basis of all expenses incurred (DR MA83). Upon completion of the Fiscal Year and upon completion of each study the Contractor shall calculate the hours expended in performance of the study. The Conversion Rate by Fiscal Year identified below shall be used for converting direct non-labor cost to hours.

5.4 Special Developmental Studies (SDS) Man-hours

(b)(4)  
5.4.1 The contractor is authorized \_\_\_\_\_ equivalent man-hours for performance of the SDS activity. For purposes of determining remaining hours, the following current year factors and conversion rates shall be used: FY94 - \_\_\_\_\_; FY95 - \_\_\_\_\_; FY96 - \_\_\_\_\_; FY97 - \_\_\_\_\_; FY98 - \_\_\_\_\_; FY99 - \_\_\_\_\_. Any unexpended FY98 hours as determined by Special Studies Report (MA83) shall be used in FY99 at the above rate prior to use of any hours contained in paragraph 5.4.2.

5.4.2 The contractor is authorized \_\_\_\_\_ equivalent man-hours for performance of FY99 SDS activity. For purposes of determining remaining hours, the following current year factor and conversion rate shall be used: FY99 - \_\_\_\_\_

5.4.3 The contractor is authorized \_\_\_\_\_ equivalent man-hours for additional FY00 SDS activity. For purposes of determining remaining hours, the following current year factor and conversion rate shall be used: FY00 - \_\_\_\_\_. Remaining hours will be refunded at this rate per Paragraph 10.0 below.

5.4.4 The Contractor is authorized \_\_\_\_\_ equivalent man-hours for performance of FY01 SDS activity. For purposes of determining remaining hours, the following current year factor and conversion rate shall be used: FY01 - \_\_\_\_\_. Remaining hours will be refunded at this rate per Paragraph 10.0 below.

5.4.5 The contractor is authorized \_\_\_\_\_ equivalent man-hours for performance of FY02 SDS activity. For purposes of determining remaining hours, the following current year factor and conversion rate shall be used: FY02 - \_\_\_\_\_. Remaining hours will be refunded at this rate per Paragraph 10.0 below.

5.5 At the end of this contract, the Contractor will submit a Target Cost, Target Fee and Award Fee adjustment proposal to the Contracting Officer for an adjustment to contract for the total number of unused hours determined as identified in paragraph 9.0 below. The Target Cost adjustment shall be calculated by multiplying the unused hours by the conversion rate for the final fiscal year. The Target Fee and Award Fee will be decreased by amounts equivalent to those established by the modification that incorporated the SDS hours into the contract.

6.0 Technology Utilization: - WBS 3.6.2.1 - The Contractor shall provide technical assistance for the evaluation of Space Shuttle systems technology and the potential application/transfer to private sector and academia. Interfaces will be established between the MSFC Project and the MSFC Technology Utilization (TU) Office. Science and Engineering Office and the applicable Industrial Application Centers and Application Team Agencies for the performance of this task. This task will provide for the coordination and interfacing with the appropriate MAF Manned Space Systems personnel on technology utilization/transfer, preparation of technical data inputs, presentation materials and status reports.

6.1 The total effort contemplated for the tasks defined as the 300 Series Technical Directives authorized under Paragraph 6.0 is ~~600~~ (4) hours. For reporting against the total direct hours, one direct man-hour is equivalent to ~~600~~ (4) of subcontract, computer, material, IDOD cost, travel or other direct costs and the appropriate material overheads and G&A as follows:

FISCAL YEAR	HOURS	HOURS USED	BALANCE OF HOURS AVAILABLE	CONVERSION RATE **	AUTHORIZING MODIFICATION
1990		<del>600</del> (4)			S/A 056

6.2 This series will be numbered 3.6.2.1-300 through 3.6.2.1-399. This effort will be continued under Attachment J-15 commencing October 1, 1989.

7.0 Work to be performed under Paragraphs 3.0, 4.0, 5.0 and 6.0 of this attachment will be within the broad parameters listed above and will be more specifically defined by means of Technical Directive (TD's) and Special Developmental Studies (SDS) executed by the Technical Manager and Contracting Officer and approved by the Contractor.

8.0 Technical Directives and Special Developmental Studies (SDS) shall be pre-coordinated between the Contractor and Technical Manager to definitize the study plan and the estimated hours required to accomplish the assigned task. The Contractor shall promptly commence work upon receipt and acknowledgment of a properly executed Technical Directive or Special Development Study.

9.0 The Contractor shall submit on a quarterly basis Document MA83- "Special Studies Report" which will identify the direct hours authorized for each Special Study and Technical Directive and the direct hours used. (Note: The report was named the "Active Technical Directive Status Report: prior to January 1, 1994.) This report is the basis for determining the number of direct hours expended by the Contractor for Technical Directives and Special Development Studies. It will be the basis for determining the number of hours remaining at the end of the contract for the purposes of adjusting the contract value for unused hours.

10.0 Once the maximum number of hours identified above for Technical Directives and Special Development Studies is reached and/or the contract period of performance is ended, the Contractor's requirements under this Attachment are fulfilled, even though the specific work may not have been completed. The Contractor will submit a contract value adjustment for unused hours as identified in Paragraphs 4.4 and 5.5 above.

11.0 If at any time during the performance of this contract, the Contractor determines that the approved hours of effort to be furnished will exceed the number of hours specified in paragraphs 3.0, 4.0, 5.0, and 6.0, the Contractor will notify the Contracting Officer and furnish with such notification, a new estimate of hours, and the parties to this contract may enter into negotiations to provide the additional hours and the associated equitable adjustment in the cost and fee.

ATTACHMENT J-7

PRINTING AND DUPLICATING REQUIREMENTS OF NASA CONTRACTS AND GRANTS

Printing, duplicating, and other reproduction of "documentation" (e.g., reports and statistical data) required by NASA contracts and grants are subject to the provisions of this Instruction and may not be used as the production method unless specifically authorized. Contracts with commercial printers--for contract field printing and for printing procured under waiver--are excluded from this prohibition. In order to comply with the provisions of this Instruction and to achieve the lowest feasible cost to NASA, the following standards will apply unless a deviation is requested from the NIRMO through the IRMO and concurred with by the contracting office in writing. The "JCP Specifications" cited herein are to be found in the Government Paper Specification Standard published by the JCP. Copies of applicable specification standards are available from contracting officers. Multiple-copy production will be accomplished through the most efficient and effective process on offset presses, duplicators, or high-speed copiers. The page image size of cover and test pages, including heading and page number, will be approximately 7-1/8 X 9-1/2 inches.

ATTACHMENT J-8

AWARD FEE EVALUATION

1.0 The Contractor's performance will be evaluated as contemplated by Contract Section B, Clause B-4. Criteria will be established to evaluate the effectiveness of the Contractor in the Quality Control and Management performance in the production and delivery of External Tanks ET-61 through ET-94 and ET-96 through ET-121. This revision to the Award Fee plan became effective with the April 1, 1999 Award Fee Period.

2.0 The Quality Control area will represent 70% of the Award Fee and Management Performance area will represent 30% of the Award Fee. The criteria will be utilized to measure the Contractor's performance in meeting the technical objectives of the program, accomplishing top quality work, meeting the major milestones on schedule and managing the program in the most efficient manner to meet program objectives. The criteria will be chosen to meet the objectives and yet be broad enough to cover all phases of the program.

3.0 Not later than thirty (30) calendar days prior to the start of each evaluation period, the Contractor will be notified by the Contracting Officer of the desired areas of the emphasis, key events, and the evaluation criteria selected for application to the specific evaluation period. Consideration will be given to the Contractor's recommendations; however, it is the Government's responsibility to establish the specific areas of work to be emphasized and the detailed criteria to be used for each evaluation period.

4.0 Within ten (10) days subsequent to any evaluation, the Contractor may provide a written report of accomplishments to the Contracting Officer to support an analysis of the Contractor's performance under the established criteria set forth in Paragraph 3.0 above.

5.0 The total Award Fee Pool and Period are apportioned as set forth in Section B, Clause B-4, Paragraph i.

ATTACHMENT J-9

POST DD-250 REQUIREMENTS FOR EXTERNAL TANKS MANUFACTURED UNDER  
CONTRACT NAS8-33708, OTHER DEFERRED WORK AND POST DD-250 ACTIVITIES

1.0 The Contractor will perform the activities below in support of External Tanks that were manufactured and delivered (DD-250) under Contract NAS8-33708:

1.1 The Contractor shall provide staging for the post-acceptance External Tanks and their ship-loose hardware and Acceptance Data Packages at MAF, providing security services and required monitoring until shipment (based on the Flight Manifest Schedule identified in Attachment J-1, paragraph 2.5) to the designated delivery site. These post-acceptance end items will be treated as "Government Property" pursuant to all provisions of the "Government Property Clause".

1.2 The Contractor will provide the transportation services required to transport External Tanks, their major subassemblies, and STE/TSE from the point of Final Assembly to the point of barge embarkation and loading, to include that effort required to load, tie down, and secure the hardware on marine vessels.

1.3 Spares for support of the Flight Program shall be provisioned by NASA in accordance with Attachment J-10, "Provisioning Procedures for External Tank Spare Parts".

1.4 Special tooling and support equipment will be provided and maintained in accordance with Attachment J-1, subparagraph 6.1.

1.5 The Contractor is authorized to replenish the flight hardware and materials that were used for completion of Contract NAS8-33708.

1.6 The Contractor shall complete the Mod Kit activities for External Tanks 43 thru 45, 48 thru 51, and 54 thru 57, authorized as of June 28, 1991 and the ET Post DD-250 Mod Center Activities for ETs 43 thru 45, 48 thru 51 and 54 thru 57.

1.7 The Contractor shall complete the Deferred Rate Tooling transferred from Contract NAS8-30300 to Contract NAS8-33708 and subsequently transferred to this contract.

1.8 This Contract does not include any effort for modification, rework/other activities not specified above (paragraphs 1.1 through 1.7) associated with External Tanks 43 thru 45, 48 thru 51, 54 thru 60 at the MAF, and 42, 47, 52, and 53 at KSC, produced under Contract NAS8-33708. Any such effort will be the subject of separate contractual action and equitable adjustment.

2.0 Post DD-250 activities for GFP LH2 Umbilical Rework.

2.1 The Contractor shall replace the GFP LH2 umbilicals on Post-Acceptance (DD-250d) External Tanks 42, 43, 44, 45, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60 and 61, and remove the GFP LH2 Umbilicals from ET-60 and ET-61 as scoped in ECPs B01917D, B01917F, B01917G, B01917H and B01917J.

ATTACHMENT J-10  
PROVISIONING PROCEDURE FOR EXTERNAL TANK SPARE PARTS

- A. The Contractor shall be responsible for recommending to NASA the spare parts required to adequately support the External Tank and its related equipment, the cost of which is not included in the estimated cost of this contract. These requirements will be submitted on a format acceptable to NASA in accordance with Logistics Program requirements shall include the total quantity, part number, description of item, quantity to be used at each site location, delivery schedule, consumption or failure rate and an estimated cost of each line item.
- B. A Release Notice signed by the Contracting Officer will be the authority for the Contractor to release the approved special tooling, support equipment and spare parts for manufacturing or procurement. Interim release authority may be implemented to authorize the Contractor to proceed to fill immediate requirements to prevent work stoppages and this shall be subsequently reflected in confirming documentation. For the purpose of this procedure, a Release Notice is defined as a letter signed by the Contracting Officer which approves, with any changes, the recommended spare parts.
- C. Work to be performed under this Attachment will be within the broad parameters listed herein and will be more specifically defined by means of an accountability report submitted semiannually. To distinguish spares provisioning accountability from other proposals, the itemized costs will be accounted for separately. This accountability is to reflect the total dollar value expended for the line item plus the labor associated with the hardware provided during the accounting period. The total effort contemplated for the task described herein is target cost in the amount of ~~105~~(4)
- If at any time during the performance of this contract, the contractor has reason to believe that the Target Cost specified above will be exceeded, the contractor will notify the Contracting Officer and furnish with such notification, a new estimate and the parties to this contract may enter into negotiations to provide additional dollars for an equitable adjustment in the Target Cost and Fee applicable to this attachment.
- D. Failure to agree to any adjustment shall be a dispute concerning a question of fact within the meaning of the clause of this contract entitled "Disputes." However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.
- E. NASA may at any time, in the manner set forth in above, order additional items and/or delete items of spare parts on order by Release Notice signed by the Contracting Officer.
- F. All fabrication, inspection, checkout, acceptance test, and preparation for delivery requirements applicable to deliverable hardware shall also apply to the terms furnished hereunder.

APPENDIX I TO ATTACHMENT J-10  
INCORPORATION OF RELEASE NOTICES

The contract has been equitably adjusted as a result of the Release Notices identified below to provision the hardware listed in the documents identified herein.

<u>Release Notice</u>	<u>Provisioning Documentation</u>	<u>Supplemental Agreement</u>
001	ECP B01850, dated December 23, 1988 (Deliver as identified therein)	065
002	PCP B80982, dated November 17, 1989 (Deliver as identified therein)	065
003	ECP B01857, dated July 12, 1989 (Deliver as identified therein)	042
004	PCP B80998, dated December 13, 1989 (Deliver as identified therein)	065
005	VECP B01852-R2, dated December 22, 1989 (Deliver as identified therein)	065
006	Cancelled per AP43-49-90	
007	ECP B01870A, dated January 12, 1990 (Deliver as identified therein)	083
008	Delete	270
009	ECP B01773A-R1, dated February 26, 1991 (Deliver as identified therein)	177
010	VECP B01950S, dated May 14, 1991 (Deliver as identified therein)	157
011	ECP B01732D dated May 27, 1992 (Deliver as identified therein)	231
012	ECP B01775D-R1, dated May 28, 1993 (Deliver as identified therein)	370
013	ECP B01991, dated April 19, 1994 (Deliver as identified therein)	370
014	ECP B01775D-R2, dated May 23, 1994 (Deliver as identified therein)	370
015	ECP B01775D-R3, dated June 21, 1995 (Deliver as identified therein)	370

APPENDIX I TO ATTACHMENT J-10  
INCORPORATION OF RELEASE NOTICES (continued)

The contract has been equitably adjusted as a result of the Release Notices identified below to provision the hardware listed in the documents identified herein.

<u>Release Notice</u>	<u>Provisioning Documentation</u>	<u>Supplemental Agreement</u>
016	LTR 96MO-0420, dated May 17, 1996 (Deliver as identified therein)	391
017	Letter 96MO-0886, dated November 6, 1996 (Deliver as identified therein)	405
018	ECP B02036, dated February 6, 1998 (Deliver as identified therein)	509
019	ECP B02038, dated April 23, 1998 (Deliver as identified therein)	509
020	ECP B02028, dated January 27, 1998 (Deliver as identified therein)	458
021	ECP B02043, dated July 23, 1998 (Deliver as identified therein)	509
022	ECP B02034, dated September 10, 1998 (Deliver as identified therein)	509
023	ECP B02041A-R1, dated January 19, 1999 (Deliver as identified therein)	523

ATTACHMENT J-11  
EXTERNAL TANK LAUNCH SUPPORT SERVICES (KSC)

1.0 PURPOSE

1.1 The purpose of this Attachment is to define the activities of the External Tank Launch Support Services that are required to provide the ET Development Contractor (MAF) expertise to the Government and the Shuttle Processing Contractor (SPC) at Shuttle Launch Site (John F. Kennedy Space Center, Florida). Personnel assigned to this task in conjunction with NASA/MSFC on site personnel will form an integrated team with ET design authority.

2.0 DEFINITIONS

ET LSS Contractor – Lockheed Martin Corporation - Personnel satisfying requirements and accomplishing launch support tasks specified herein at KSC.

ET MAF Contractor - Lockheed Martin Corporation personnel located at MAF. ET Development Contractor.

MSFC - Marshall Space Flight Center - ET Development Center, the National Aeronautics and Space Administration (NASA), George C. Marshall Space Flight Center.

Launch Site Government Representatives - Individuals assigned to the NASA/KSC Space Shuttle Launch Site Management Organizations.

MSFC Resident Office (RO) Representatives - MSFC Government ET Project Representatives permanently stationed at the KSC launch site to provide Development Center/Project authority to the launch site.

3.0 WORK TASKS

3.1 ET LSS Contractor personnel shall furnish the necessary services, engineering skills, materials, and equipment (except that provided by the Government) in support of the Operations Phase of the Shuttle Transportation System. Work to be performed will be in general accordance with the following:

3.1.1 Operations Support

3.1.2 Design Liaison - provide on-site interpretation of design and test requirements for the ET and support equipment developed by ET MAF Contractor. Coordinate information and exchange of data between ET MAF Contractor and launch site organizations.

3.1.3 Coordinate on-site real-time photo documentation for ET configuration details, ET anomalies for recurrence control reporting and solution purposes, and for Material Review Board (MRB) engineering review and disposition.

3.1.4 Test Support - Coordinate requests between ET LSS Contractor and the SPC for ET MAF Contractor monitoring or participation in SPC tests, and SPC monitoring or participation in ET MAF Contractor tests.

3.1.5 Readiness Reviews - Support the Government and the SPC in preparations for readiness status at launch site readiness reviews. Coordinate with the SPC in preparation of presentations for MSFC readiness reviews. In general, this coordination will consist of obtaining data on ET processing, including planned/unplanned work and modification status, launch site anomalies, field changes, launch site deviations/waivers and open issues. Provide for timely ET Contractor launch site support of readiness statements and the Certificate of Flight Readiness (COFR) activities.

3.1.6 Spares Provisioning - Coordinate between ET MAF Contractor, MSFC and the SPC on requirements for spares and materials to be shipped from the ET production facility or vendors, and disposition of removed items or items which require retest and other rework (e.g., time/life refurbishment). Coordinate transmittal of spares usage data, purchase requisition requests, and recommendations from the SPC to ET MAF Contractor. Coordinate with ET MAF Contractor to expedite shipment of spares and materials as needed by the SPC.

3.1.7 Planning - Coordinate between the ET MAF Contractor, MSFC and the SPC on ET related support equipment and modification kit delivery schedules, configuration, condition, and potential or pending changes.

3.1.8 Technical Operating Procedures (TOPs) - Review and approve, prior to implementation, ET TOPs that change External Tank requirements or configuration which include OMIs, ICRs/deviations, IPR/Problem Reports, Test Preparation Sheets, and changes thereto. ET related Application Software change packages will be reviewed for compatibility with ET MAF Contractor design and test requirements, and to identify incompatibilities, inaccuracies, inadequacies, and recommended alternatives. The change packages will have an LSS concurrence or non-concurrence signature prior to submittal to the KSC Technical Review Panel

3.1.9 Launch Site Recommended Changes - Coordinate between the SPC and ET MAF Contractor on launch site recommended mandatory and improvement changes to the ET related support equipment and modification kits.

3.1.10 Launch Support - Monitor, in the Launch Control Center Engineering Support Area, propellant loading and ET related pre-launch activities and provide technical assistance as requested by the Launch Site Government Representatives or the SPC.

3.1.11 Transportation Equipment - Provide on-site system expertise on ET MAF Contractor Rotational Support Equipment. Coordinate operational problems between ET MAF Contractor and the SPC.

3.1.12 ET Product Support Team - Provide review and approval of MRB dispositions prior to work. Support and monitor ET Receiving Inspection and other selected processing activities. Review problem reports for recurrence control actions.

### 3.2 Anomalies

3.2.1 In-Flight - Provide technical assistance to the launch site Government representatives and the SPC in understanding MSFC/ET MAF Contractor proposed resolution of in-flight anomalies.

3.2.2 Failure Analysis - Provide technical support to the SPC for anomaly resolution, failure analysis and corrective action. With concurrence of ET MAF Contractor and MSFC-Resident Office (RO), failure analysis may be performed on-site (KSC), at the ET MAF Contractor Facility, the vendor facility or at a facility other than the facility of the vendor who supplied the item.

3.2.3 Disposition of Discrepant Hardware - Upon notification by the SPC, support the SPC in determining the disposition of selected ET and associated support equipment/software and facility system PR discrepancies.

3.2.4 Recurrence Control (Corrective Action) - Assist the SPC in determining the need for, and coordinate transmittal of Corrective Action Assistance Requests to the ET MAF Contractor and MSFC. All requests for recurrence control action at ET MAF Contractor will be reviewed by the ET LSS Contractor.

3.2.5 Unexplained Anomalies - Coordinate between the SPC/Launch Site Government Representative and ET MAF Contractor to attain agreement on the existence and acceptability or rejection of unexplained anomalies. ET LSS Contractor shall approve the final disposition of the unexplained anomalies and provide concurrence for closeout rationale.

3.2.6 Launch Site Deviation/Waivers and Material Reviews - Coordinate between the SPC, ET MAF Contractor and MSFC actions relating to deviations, waivers and material reviews for out-of-specification or drawing non-conformance conditions. ET LSS contractor shall approve, as well as coordinate, MSFC approval on launch site waivers and material review actions. LSS is a member of the Material Review Board (MRB) and when applicable, the Prime Material Review Board (PMRB).

### 3.3 Configuration Management

3.3.1 Operation and Maintenance Requirements Specification Document (OMRSD), Requirements Change Notices (RCNs) and Launch Commit Criteria (LCC) - Provide interpretation of requirements and intent of the basic OMRSD, LCC and changes thereto. Participate in RCN/LCC reviews and support the Government with technical comments for OMRSD/LCC changes.

3.3.2 Change Boards - Review change requests and hardware/software change packages. Participate in Level II and Launch Site Level III Change Board activities. Review SPC modification list for all ET MAF Contractor end items.

3.3.3 End Item Acceptance - Provide ET MAF Contractor information on hardware/software end item turnover which will include as a minimum, identification of changes to planned work, open (incomplete production) work, configuration changes from prior deliveries and unique requirements. Coordinate requirements for SPC participation in end item acceptance reviews.

### 3.4 Modifications Kits

3.4.1 Flight Hardware Mod Kits - Review and approve SPC Test Compliance Technical Instruction (TCTI) implementation paper, review closure data from SPC and provide to ET MAF Contractor.

3.4.2 Support equipment and Facilities - Review proposed launch site support equipment, facilities, and ET related software changes for possible effect on the ET and ET support equipment. Coordinate results of this review with ET MAF Contractor. Participate in launch site change boards and provide ET Contractor assessment of proposed launch site equipment and facility changes.

3.4.3 Design Reviews - Participate in ET related launch site support equipment and facility design reviews, identifying apparent discrepancies and recommending changes.

3.4.4 Field Changes - Evaluate field change requests to the ET and modification kits as requested by the SPC. Prepare a Field Engineering Change (FEC) where time is critical and coordinate with ET MAF Contractor, MSFC Resident Office (RO) and Government approvals. If time permits, coordinate and request an Expedited Mod Kit (EMK) from ET MAF Contractor, instead of the FEC.

### 3.5 Interfaces

3.5.1 Formal - Establish and maintain formal interfaces with MSFC Resident Offices and Launch Site Government Representatives. All requests from ET MAF Contractor that require an SPC response will be formal and shall be approved by the MSFC Resident Office and the cognizant Launch Site Government Representative. The ET LSS Contractor will establish and maintain a tracking system for actions requested from both ET MAF Contractor and the SPC.

3.5.2 Informal - Establish and maintain informal interfaces with the SPC through day-to-day contact and monitoring and participation in interfaces will be used to ensure SPC understanding of ET design and test requirements, and ET MAF Contractor ability to support readiness reviews.

3.5.2.1 Support for Special Launch Site Needs - Coordinate with the SPC and ET MAF Contractor to obtain support for special launch site needs. These needs may include engineering, technical, scientific, or management systems personnel; resources test or scientific equipment and facility resources, factory tools, materials and shop aids.

3.5.2.2 Maintain access to ET MAF Contractor data relating to planning, engineering, logistics, reliability, quality, safety, design and modifications.

### 3.6 Training and Certification at KSC

3.6.1 Training Plan - Prepare and implement a training plan for certification, recertification and standboarding of ET LSS Contractor personnel (MMC-ET-LSS-003 Latest Revision).

## 4.0 KSC CONTRACTOR'S INTEGRATED SUGGESTION SYSTEM (CISS)

4.1 KSC LSS personnel are eligible to participate in the KSC CISS Program, in accordance with the KMI 3452.1 Document, latest revision, and listed in Attachment J-1, Paragraph 3.4, Requirements Documents.

ATTACHMENT J-12  
EXTERNAL TANK FLIGHT OPERATIONS (W.B.S. 3.6.2.2)

1.0 The External Tank Flight Operations Support effort is designed to provide Contractor technical/logistics capability for flight unique/mission specific activities (SFOC Processing Unique) involved in launch preparation/support areas such as MSFC HOSC, Mission Support Room, OMRSD/LCC/OMI Reviews and Flight Evaluations.

2.0 The Contractor shall furnish the necessary engineering skills, labor, materials and equipment (except that specified to be provided by the Government) to perform the following requirements/tasks:

2.1 Support to Launch Site Flight Operations

Provide MAF and on-site MSFC support to the MSFC ET Project and to the Lockheed Martin Launch Support Services (LSS) team on-site at Kennedy Space Center (KSC). The MAF effort required to support the LSS and Shuttle Processing Contractor (SPC) site interface covers KSC flight unique operations.

2.1.2 Engineering Reliability Support

The Contractor shall provide launch site flight unique engineering reliability support to ET operational use with reliability analyses, trade studies, statistical analyses and failure rate determinations.

2.2 Flight Evaluation

The Contractor shall provide Engineering technical capability to support flight performance assessments as required to support Shuttle Systems Integration and Mission Success. Specific support requirements/activities encompassed by this task are as follows:

Support flight evaluations with analysis and provide input to the report of demonstrated performance on each flight.

Support via telecon, the MSFC ET Contractor FEG Quick Look and Final Evaluation Meetings and provide graphical data and text input as requested for the MSFC ET Contractor FEG STS Final Report for each STS Mission.

Prepare and submit to the ET Project Office an ET MAF Contractor STS Engineering Evaluation Final Report for each flight in accordance with established report format.

Evaluate and document flight problems or anomalies as defined in Paragraph 7.3 of the operational Space Shuttle Evaluation Plan if required for each STS Mission. This activity includes support to the MSFC Problem Assessment System (PAS) for flight hardware malfunctions requiring corrective action (this is based on a maximum of one CAPs per flight)

## 2.2 Flight Evaluation (continued)

Appropriate anomaly investigation will be performed by the Contractor. Anomalies to be evaluated will be limited to the period from countdown (T-1 day) through ET breakup and reported by the Flight Evaluation Working Group

The Contract will be equitably adjusted for any internal/external ET Contractor Assessment activities resultant from the lessons learned from the major anomaly investigation.

ATTACHMENT J-13

VECP \_\_\_\_\_

INSTANT UNIT COST REDUCTION ( \_\_\_\_\_ )

Computation of Savings

1. Estimated Savings on the Instant Contract ..... ( \_\_\_\_\_ )
2. Future Contract Savings Identified ..... ( \_\_\_\_\_ )
3. Concurrent Contract Savings Identified ..... ( \_\_\_\_\_ )
4. Gross Acquisition Savings (Lines 1, 2 & 3) ..... ( \_\_\_\_\_ )
5. Estimated Implementation Cost ..... \_\_\_\_\_
6. Estimate of Cost to be Incurred by the Government .....  
outside the Martin Marietta Contracts
7. Gross Implementation Cost (Lines 5 thru 7) ..... \_\_\_\_\_
8. Net Acquisition Savings (Line 4 minus 7) ..... ( \_\_\_\_\_ )
9. Contractor Dollar Share (25% X Line 8) ..... \_\_\_\_\_
10. Number of Units to be Delivered in Sharing Period ..... \_\_\_\_\_
11. Number of Units Required to Offset Government Cost ..... \_\_\_\_\_
12. Date on which Contractor's Share can begin being paid ..... \_\_\_\_\_
13. Contractor share on instant contract ..... \_\_\_\_\_
14. Contractor share on future contracts ..... \_\_\_\_\_

VE Form 001 Rev A

By-Line Explanation of Form VE-001 Rev A - Computation of Savings

- Line 1 - This line should reflect the total savings that are to be realized on the instant contract. This value shall take into consideration the impacts of learning, escalation, etc. The per unit sharing shall be calculated by dividing number of units under instant Contract Affected into the instant Contract Savings.
- Line 2 - This line should reflect a multiplication of the per unit Savings determined above by the number of units deliverable during the sharing period and not procured under the instant contract. This value shall also reflect the impacts of learning, escalation, etc.
- Line 3 - This line should reflect the Contractor's estimate of savings/cost, generated by this change, that will occur on NAS8-33708 and NAS8-36747(F). These estimates shall be fully supported and documented.
- Line 4 - This line reflects a summation of Lines 1, 2 and 3.
- Line 5 - This line should reflect all cost or VECP development and implementation.
- Line 6 - This line should reflect all Government cost (other than incurred under the instant or concurrent Contract) involved in the design development, test and evaluation of the proposed VECP. Government personnel will, upon request, assist the Contractor in computing this amount.
- Line 7 - This line reflects a summation of Lines 5 and 6.
- Line 8 - Subtracting Line 7 from Line 4 provides the Net Acquisition Savings resulting from this change.
- Line 9 - Application of Contractor's share in Net Acquisition Savings (25%) will render the Contractor's dollar share.
- Line 10 - Look at Delivery Schedule to determine Total Number of units to be delivered during sharing period.
- Line 11 - Divide Line 7 by Instant Unit Cost Reduction in round up to the next whole number.
- Line 12 - Add the number shown on Line 11 to the First Affected ET, as shown on the form. Then look up date when this ET is to be delivered.

- Line 13 -
- (i) Look in Delivery Schedule to determine how many ET's are to be delivered from the date (inclusive) shown on Line 12 until the end of the contract;
  - (ii) Subtract the number on Line 11 from the total number of units to be procured in the sharing period;
  - (iii) Divide the sum of exercise (i) by the sum of exercise (ii) to arrive at a percentage. Multiply this percentage by the value shown on Line 9 to compute the Contractor's Dollar Share under the instant contract.
- Line 14 - Subtract Line 13 from Line 9 to arrive at the Contractor's Dollar Share of savings to be provided in a follow-on contract.

ATTACHMENT J-14

ENERGY COST REDUCTION PROGRAM

A. The Contractor shall implement a self-sustaining Energy Cost Reduction Program at MAF which will enhance the current energy conservation measures; provide for reduction of MAF energy costs and External Tank Costs; provide Contractor incentivization to develop, design, and implement energy cost reduction projects; provide alternate funding sources for project implementation; and allow for project cost recovery through energy savings. As used herein, Energy Cost Reduction includes reduction of consumption and/or per unit energy cost via a comprehensive variety of projects and programs. This program shall be implemented in accordance with the provisions defined below.

B. The Contractor will provide support to the NASA-MAF Energy Conservation Committee.

C. (1) The Contractor shall receive an additional Award Fee in accordance with the provisions of this Attachment and will be reflected in clause B-2 of this contract for exceptional performance in the management of Energy Usage at MAF. Exceptional performance shall be defined as management of the energy usage program to underrun the established goal. Energy usage reduction shall be defined as the reduction in usage of electricity and natural gas. This performance shall be measured on an annual basis against the goals as established annually and listed below.

Goal for Natural Gas\*

FY 1991 - 538,510 MCF	547.5 X 10 <sup>9</sup> BTUs
FY 1992 - 492,547 MCF	507.8 X 10 <sup>9</sup> BTUs
FY 1993 - 472,505 MCF	487.2 X 10 <sup>9</sup> BTUs
FY 1994 - 478,985 MCF	493.8 X 10 <sup>9</sup> BTUs
FY 1995 - 477,985 MCF	492.8 X 10 <sup>9</sup> BTUs
FY 1996 - 550,835 MCF	567.91 X 10 <sup>9</sup> BTUs
FY 1997 - 552,343 MCF	569.47 X 10 <sup>9</sup> BTUs
FY 1998 - 552,343 MCF	569.47 X 10 <sup>9</sup> BTUs
FY 1999 - 552,343 MCF	569.47 X 10 <sup>9</sup> BTUs
FY 2000 - 546,943 MCF	563.91 X 10 <sup>9</sup> BTUs
FY 2001 - 521,943 MCF	538.13 X 10 <sup>9</sup> BTUs
FY 2002 - 506,943 MCF	522.67 X 10 <sup>9</sup> BTUs

Goals for Electricity \*

FY 1991 - 133,563 KWH (000)	1549.3 X 10 <sup>9</sup> BTUs
FY 1992 - 138,635 KWH (000)	1607.8 X 10 <sup>9</sup> BTUs
FY 1993 - 137,789 KWH (000)	1598.4 X 10 <sup>9</sup> BTUs
FY 1994 - 136,337 KWH (000)	1581.5 X 10 <sup>9</sup> BTUs
FY 1995 - 137,974 KWH (000)	1600.5 X 10 <sup>9</sup> BTUs
FY 1996 - 138,068 KWH (000)	1601.59 X 10 <sup>9</sup> BTUs
FY 1997 - 139,791 KWH (000)	1621.58 X 10 <sup>9</sup> BTUs
FY 1998 - 140,696 KWH (000)	1632.07 X 10 <sup>9</sup> BTUs
FY 1999 - 140,751 KWH (000)	1632.71 X 10 <sup>9</sup> BTUs
FY 2000 - 140,903 KWH (000)	1635.50 X 10 <sup>9</sup> BTUs
FY 2001 - 141,169 KWH (000)	1637.56 X 10 <sup>9</sup> BTUs
FY 2002 - 141,668 KWH (000)	1643.35 X 10 <sup>9</sup> BTUs

\* Appendix IV provides backup detail.

The basis of measurement will be a comparison of the goal established above and metered usage submitted on form MSFC 3906 "Energy Usage Input".

(2) In recognition of exceptional efforts by the Contractor in underrunning the energy goals established above, the Contracting Officer will award an additional fee to the Contractor as set forth:

<u>% Under Goal</u>	<u>Energy Reduction Award Fee</u>
.1 to 5%	8%
5.1 to 10%	10%
10.1 to 15%	12%
15.1 and up	14%

(3) The following method shall be used to determine the Award Fee payable to the Contractor for underrunning the established goals.

a. Contractor Performance Against Established Goals

BTU Goal for Electricity - BTUs Actual for Electricity = \_\_\_\_\_

BTU Goal for Natural Gas - BTUs Actual for  
Natural Gas = \_\_\_\_\_

Total Under/\*Over Goal \_\_\_\_\_

b. Percent Under Goal to be Applied to Paragraph C2

Percent Under Goal =  
$$\frac{\text{BTUs Under Goal}}{\text{Total BTUs for Electricity and Natural Gas}} \times 100$$

c. Contractor's Earned Award Fee

$$[(** \text{ Average Cost per BTU for Electricity} \times \text{BTUs Under Goal for Electricity}) \pm (** \text{ Average Cost per BTU for Natural Gas} \times \text{BTUs Under Goal for Natural Gas})] \times \text{Percent Energy Reduction Award Fee (Paragraph C.2)}$$

D. The Contractor shall implement a program for Special Energy Cost Reduction Projects. A proposal for each project and estimated cost will be submitted to the Contracting Officer for approval and will be identified as an Energy Cost Reduction Proposal. Upon approval, the project and estimated cost to implement will be identified in Appendix I to this Attachment. Resulting savings from implementation of the project may be calculated using an established formula and/or historical data versus actual metered usage. Once all Government costs have been

fully offset, the Contractor may begin vouchering on an annual basis for the Contractor's share of savings which shall be 25% of the annual calculated or measured savings. A project to be considered under this section should recover implementation costs within a three year period. The Contractor shall be entitled to share in the savings for a period of not less than five years. Should the contract period of performance be less than the share period, the Contractor may voucher for the balance of the savings upon the delivery of ET-121 (DD-250 date) or continue the savings on the follow-on contract. The Contractor's share of savings will be recorded in Appendix I to this Attachment and added to clause B-2 as an adjustment to the KOR (Contractor's) Share for the Energy Cost Reduction Program. This adjustment to the KOR Share for ECRP will be by Contract Modification and will be payable upon receipt of the fully executed Contract Modification.

\* If over goal the Contractor does not receive an Award Fee and no further calculations are required.

\*\* Average Cost per BTU for Electricity and Natural Gas shall be determined by averaging the monthly BTU cost for each utility as reported to NASA Resident Office.

E. The Contractor is authorized to use capital investment money to institute Government approved Energy Cost Reduction Projects at MAF. A proposal will be submitted to the Contracting Officer identifying each project as an Energy Cost Reduction Project and as a Contractor funded project. Upon approval, the project shall be identified in Appendix II of this Attachment. The Contractor shall be reimbursed by the Government from the Savings generated by the project. The savings shall be determined by usage of methods in Paragraph D above. The Contractor shall begin vouchering for the savings three months after the project installation is completed and will continue until all costs for implementation have been offset. For a period of not less than 10 years after the costs are offset, the Government and Contractor will share 50/50 on the savings. Should the Period of Performance for the contract end, the project savings can be transferred to the follow-on contract or the Contractor may voucher for balance of savings upon delivery (DD250) of ET-121.

F. The Contractor is authorized to solicit third party investments for Energy Cost Reduction Projects at MAF. A proposal will be submitted to the Contracting Officer identifying the Project as an ECRP and as funded by a third party. Upon approval by the Contracting Officer, the Contractor will enter into an agreement with the third party to implement the project. Projects approved shall be listed in Appendix III of this Attachment. The savings shall be determined by usage of either method specified in Paragraph D above. The Contractor shall begin vouchering for the savings monthly after the project is implemented. The Contractor shall transfer all savings to the third party until the full costs of installation are offset.

When the costs of implementation are offset, the Government, and the Contractor will share 25/75, respectively, in the continued Project Savings for a period which shall be established for each project. The Contractor will be responsible for reaching mutual agreement with the third party for the distribution of the 75% savings. Should the Period of Performance for the contract end, the project savings can be transferred to the follow-on contract or a separate contract will be executed allowing the Contractor to continue to voucher on an annual basis for the KOR Share for these third party funded projects.

APPENDIX I  
SPECIAL ENERGY REDUCTION PROJECTS

<u>Project Title</u>	<u>UCN</u>	<u>Price</u> <u>(Target Cost/</u> <u>Target Fee)</u>	<u>Calculated</u> <u>Savings</u>	<u>Period for</u> <u>Gov't to</u> <u>Recover Price</u>	<u>Contractor's</u> <u>Share</u> <u>Per Year</u>	<u>Contractor's</u> <u>Share Begins</u>	<u>Contractor's</u> <u>Share Ends</u>
East/West Master Substation Power Factor Corrective Action	B80791			Jan. 1, 1989 thru Dec. 1989		Dec. 1989 **	Dec. 31, 1994
Refund of MAF's Electric utility's Overearnings	B81328			July 1994 thru August 1994		Sept. 1994	Jan. 1995
Base Rate Reduction	B81328			Jan. 1995 to Dec. 1995		Jan. 1995	Dec. 2001
1995 Overearnings	B81328			Jan. 1995 to Dec. 1996		Jan. 1995	Dec. 1996
1994 Grand Gulf Overcollections	B81328			Jan. 1995 to Dec. 1995		Jan. 1995	Dec. 1995
1996 Grand Gulf Overcollections	B81328			Jan. 1995 to Dec. 1995		Jan. 1995	Dec. 2000
MAF Natural Gas Utility Rate Reduction	B81347			Oct. 1995 to Oct 1996		Oct. 1995	Sept. 2001

(1) Estimated Savings per year. 1994 overearnings savings will be calculated at a rate of : used from 1/95 to 7/95; 1995 Grand Gulf Overcollections savings will be calculated at a rate of : used from 1/95 to 7/95.

(2) Estimated Savings per year. Savings will be calculated at a rate of : used from 1/95 and continuing for 21 months.

(3) The 1994 Grand Gulf Overcollections based on actual negotiated savings of ' estimate of an annual pool of money.

(4) Estimated Savings per year. This savings is developed as a negotiated percentage of the total city wide savings due to projected 1996 Grand Gulf rates. This estimate of an annual pool of money.

(5) The calculated Contractor's Share Per Year is an average.

\* Estimated Savings per year. Savings will be determined annually using Attachment 1 to this Appendix.

Actual KVA demand will be determined from NOPS1 billings.

\*\* The balance of the Contractor's Share of Savings for the remainder of the savings period, July 1, 1991 through December 31, 1994, transferred from Contract NAS8-33708.

ATTACHMENT 1 TO APPENDIX I  
KVA SAVINGS CHART

	<u>KVA DEMAND</u>	<u>KVA SAVINGS</u>	<u>KVA DEMAND</u>	<u>KVA SAVINGS</u>	<u>KVA DEMAND</u>	<u>KVA SAVINGS</u>	<u>KVA DEMAND</u>	<u>KVA SAVINGS</u>	<u>KVA DEMAND</u>	<u>KVA SAVINGS</u>
1	14000	3175	17000	3581	20000	3700	23000	3538	26000	3676
2	14100	3174	17100	3594	20100	3685	23100	3544	26100	3679
3	14200	3190	17200	3607	20200	3645	23200	3550	26200	3683
4	14300	3205	17300	3620	20300	3629	23300	3555	26300	3686
5	14400	3221	17400	3633	20400	3638	23400	3561	26400	3689
6	14500	3237	17500	3646	20500	3647	23500	3566	26500	3692
7	14600	3253	17600	3659	20600	3631	23600	3571	26600	3695
8	14700	3268	17700	3650	20700	3614	23700	3577	26700	3698
9	14800	3284	17800	3663	20800	3597	23800	3582	26800	3701
10	14900	3299	17900	3676	20900	3606	23900	3587	26900	3704
11	15000	3314	18000	3688	21000	3614	24000	3592	27000	3707
12	15100	3329	18100	3700	21100	3596	24100	3597	27100	3709
13	15200	3344	18200	3713	21200	3578	24200	3601	27200	3712
14	15300	3359	18300	3725	21300	3560	24300	3606	27300	3714
15	15400	3374	18400	3737	21400	3568	24400	3611	27400	3717
16	15500	3389	18500	3749	21500	3549	24500	3616	27500	3719
17	15600	3404	18600	3738	21600	3556	24600	3620	27600	3722
18	15700	3419	18700	3727	21700	3563	24700	3625	27700	3724
19	15800	3433	18800	3739	21800	3544	24800	3629	27800	3726
20	15900	3448	18900	3727	21900	3551	24900	3633	27900	3728
21	16000	3462	19000	3738	22000	3558	25000	3638	28000	3730
22	16100	3476	19100	3726	22100	3538	25100	3642		
23	16200	3491	19200	3737	22200	3544	25200	3646		
24	16300	3505	19300	3724	22300	3551	25300	3650		
25	16400	3519	19400	3735	22400	3530	25400	3654		
26	16500	3533	19500	3746	22500	3536	25500	3658		
27	16600	3547	19600	3708	22600	3515	25600	3661		
28	16700	3540	19700	3694	22700	3521	25700	3665		
29	16800	3554	19800	3680	22800	3527	25800	3669		
30	16900	3567	19900	3690	22900	3533	25900	3672		

ATTACHMENT II TO APPENDIX I

<u>PROJECT TITLE</u>	<u>SPECIAL ENERGY REDUCTION PROJECTS</u> <u>PERIOD FOR SHARE</u>	<u>CONTRACTOR'S SHARE</u>	<u>CUMULATIVE SHARE VALUE</u>
East/West Master Substation Power Factor Corrective Action	July 1, 1991 thru June 30, 1992	0.5 (4)	
	July 1, 1992 thru June 30, 1993		
	July 1, 1993 thru June 30, 1994		
	July 1, 1994 thru December 31, 1994		
Base Rate Reduction	January 1, 1995 thru December 31, 1995		
	January 1, 1996 thru December 31, 1996		
	January 1, 1997 thru December 31, 1997		
	January 1, 1998 thru December 31, 1998		
	January 1, 1999 thru December 31, 1999		
	January 1, 2000 thru December 31, 2000		
	January 1, 2001 thru December 31, 2001		
1994 Grand Gulf Overcollections	January 1, 1995 thru December 31, 1995		
1995 Over-Earnings	January 1, 1995 thru December 31, 1995		
	January 1, 1996 thru December 31, 1996		

ATTACHMENT II TO APPENDIX I (CONTINUED)

SPECIAL ENERGY REDUCTION PROJECTS

<u>PROJECT TITLE</u>	<u>PERIOD FOR SHARE</u>	<u>CONTRACTOR'S SHARE</u>	<u>CUMULATIVE SHARE VALUE</u>
<b>1996 Grand Gulf Overcollections</b>	January 1, 1995 thru December 31, 1995		
	January 1, 1996 thru December 31 1996		
	January 1, 1997 thru December 31, 1997		
	January 1, 1998 thru December 31, 1998		
	January 1, 1999 thru December 31, 1999		
	January 1, 2000 thru December 31, 2000		
<b>MAF Natural Gas Utility Rate Reduction</b>	October 1, 1995 thru September 30, 1996		
	October 1, 1996 thru September 30, 1997		
	October 1, 1997 thru September 30, 1998		
	October 1, 1998 thru September 30, 1999		
	October 1, 1999 thru September 30, 2000		
	October 1, 2000 thru September 30, 2001		

(b)(4)

APPENDIX II

CONTRACTOR FUNDED ENERGY REDUCTION PROJECTS

<u>PROJECT TITLE</u>	<u>UCN</u>	<u>COSTS</u>	<u>CALCULATED SAVINGS</u>	<u>PROVIDED FOR GOV'T TO RECOVER PRICE</u>	<u>CONTRACTOR'S SHARE OF SAVINGS</u>	<u>CONTRACTOR'S SHARE BEGINS</u>	<u>CONTRACTOR'S SHARE ENDS</u>
Optimization of Bldg. 320 Chiller Operations	B80971	(b) (4)	(b) (4)	1/3/89 - 7/31/89	(b) (4)	8/1/89*	7/31/99

\* The balance of the Contractor's Share of Savings for the remainder of the savings period July 1, 1991 through July 31, 1999, transferred from Contract NAS8-33708.

ATTACHMENT I TO APPENDIX II

CONTRACTOR FUNDED ENERGY REDUCTION PROJECTS

<u>PROJECT TITLE</u>	<u>PERIOD FOR SHARE</u>	<u>CONTRACTOR'S SHARE</u>	<u>TOTAL SHARE VALUE</u>
Optimization of Bldg. 320 Chiller Operations	July 1, 1991 thru June 30, 1992	14.7	
Optimization of Bldg. 320 Chiller Operations	July 1, 1992 thru June 30, 1993		
Optimization of Bldg. 320 Chiller Operations	July 1, 1993 thru June 30, 1994		
Optimization of Bldg. 320 Chiller Operations	July 1, 1994 thru June 30, 1995		
Optimization of Bldg. 320 Chiller Operations	July 1, 1995 thru June 30, 1996		
Optimization of Bldg. 320 Chiller Operations	July 1, 1996 thru June 30, 1997		
Optimization of Bldg. 320 Chiller Operations	July 1, 1997 thru June 30, 1998		
Optimization of Bldg. 320 Chiller Operations	July 1, 1998 thru June 30, 1999		

APPENDIX III

THIRD PARTY FUNDED ENERGY REDUCTION PROJECT

<u>PROJECT TITLE</u>	<u>UCN</u>	<u>COSTS</u>	<u>CALCULATED SAVINGS</u>	<u>PERIOD FOR 3RD PARTY TO RECOVER PRICE</u>	<u>CONTRACTOR'S SHARE OF SAVINGS</u>	<u>3RD PARTY SHARE OF SAVINGS</u>	<u>SHARE PERIOD</u>
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APPENDIX IV

BASELINE FY91

1. Conversion Factors:      Electric = KWH x 11600 = BTU (10E9)  
   Natural Gas = Cu Ft x 1031 = BTU (10E9)
2. Excludes Navy and USDA.
3. Excludes any energy demand increases due to new business/ASRM Activities.
4. Estimate for FY91 is for a 2 shift operations.
5. Weather Data FY88:      1459 HDD, 2510 CDD.

ELECTRIC

KWH (000)	BTU (10E9)	REASON
122,250	1418	A
1,246	14.5	B
2,464	28.56	C
3,521	40.83	D
925	10.73	E
266	3.088	F
23	.269	G
35	.407	H
<u>2,833</u>	<u>32.9</u>	I
133,563	1,549.3	

- A. FY88 baseline used as a base (from Finance department).
- B. Delta FY89 includes Schedule A equipment, Macintosh.
- C. Delta FY90 includes Schedule A equipment, 101/102 FH, solvent recovery, solid waste incinerator, maintenance shutdown of electric chiller.
- D. Schedule A equipment scheduled to come on line throughout FY91.
- E. Engineering Estimate of CoF, R and A, and RFFs to come on line in FY91.
- F. Electro-Dialysis Reversal (EDR) unit at IWTF, engineering estimate based on operating hours.
- G. Hazardous waste incinerator, engineering estimate based on operating hours.
- H. Freon distillation unit, engineering estimate based on operating hours.
- I. Restore Building 451 AHU - installing larger units.

APPENDIX IV

BASELINE FY91 (continued)

NATURAL GAS

Cu Ft (000)	BTU (10E9)	REASON
505,330	520.8	A
8,076	.832	B
22,347	23.04	C
2,607	2.688	D
<u>150</u>	<u>.1548</u>	E
538,510	547.5	

- A. FY88 actual usage used as base.
- B. Delta FY89 includes: R and A paint spray booth.
- C. Delta FY90 includes: Solvent Recovery, solid waste incinerator, steam chiller.
- D. Hazardous Waste incinerator, engineering estimate.
- E. Engineering estimate of CoF, R and A and RFFs to come on line in FY91.

# APPENDIX IV

## BASELINE FY92

1. Conversion Factors:      Electric = KWH x 11600 = BTU (10E9)  
   Natural Gas = Cu Ft x 1031 = BTU (10E9)
2. Excludes Navy and USDA.
3. Excludes any energy demand increases due to new business activities.
4. FY88 Baseline year.
5. - 2 shift operation  
     - 1459 HDD, 2510 CDD

## ELECTRIC

KWH (000)	BTU (10E9)	REASON
122,250	1,418.0	A
11,732	136.2	B
4,132	47.9	C
199	2.3	D
96	1.1	E
169	2.0	F
18	.21	G
26	.3	H
<u>2</u>	<u>.02</u>	I
138,635	1,607.8	

Reason:

- A. FY88 baseline used as a base (from Finance department).
- B. FY89-91 - Equipment/projects added in previous years \*.
- C. Schedule A equipment scheduled to come on line throughout FY92.
- D. Engineering estimate of CoF, R and A, and RFFs to come on line in FY92.
- E. Electro-Dialysis Reversal (EDR) unit at IWTF, based on estimated run time.
- F. Solid waste incinerator, based on estimated run time.
- G. Hazardous Waste Incinerator, based on estimated run time.
- H. Solvent Recovery, based on estimated run time.
- I. Freon distillation unit, based on estimated run time.

\* Due to their variability, Solvent recovery system and the Solid Waste Incinerator, which were included in Delta FY90 in previous baselines are now items E. and F.

APPENDIX IV

BASELINE FY92 (continued)

NATURAL GAS

Cu Ft (000)	BTU (10E9)	REASON
505,330	520.8	A
8,076	8.3	B
11,348	11.7	C
499	.51	D
1,901	1.96	E
1,969	2.03	F
<u>-36,576</u>	<u>-37.7</u>	G
492,547	507.8	

Reason:

- A. FY88 actual usage used as base.
- B. Delta FY89 - Equipment/projects added in previous years.
- C. Solid Waste Incinerator, based on estimated run time.
- D. Solvent Recovery, based on estimated run time.
- E. Hazardous Waste incinerator, based on estimated run time.
- F. CoF and R&A projects to come on line in FY92.
- G. Steam turbine chiller was not operated.

APPENDIX IV

BASELINE FY93

1. Conversion Factors:      Electric = KWH x 11600 = BTU (10E9)  
   Natural Gas = Cu Ft x 1031 = BTU (10E9)
2. Excludes Navy and USDA.
3. Excludes any energy demand increases due to new business activities.
4. FY88 Baseline year.
5. - 2 shift operation  
     - 1459 HDD, 2510 CDD

ELECTRIC		
KWH (000)	BTU (10E9)	REASON
122,250	1418.10	A
13,790	159.96	B
955	11.08	C
750	8.70	D
37	.43	E
7	.08	F
<u>137,789</u>	<u>1,598.4</u>	

Reason Code:

- A. FY88 actual usage used as a base (from Finance department).
- B. FY89 - 92 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on line throughout FY93.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY93.
- E. Electro-Dialysis Reversal (EDR) unit-at IWTF, based on estimated run time.
- F. Solvent Recovery-based on estimated run time.

APPENDIX IV

BASELINE FY93 (continued)

NATURAL GAS

Cu Ft (000)	BTU (10E9)	REASON
505,330	521.00	A
2,050	2.11	B
142	.15	C
1,559	1.61	D
<u>-36,576</u>	<u>-37.71</u>	E
472,505	487.2	

Reason Code:

- A. FY88 actual usage used as base.
- B. FY89 - 92 Equipment/projects added in previous years.
- C. Solvent Recovery, based on estimated run time.
- D. CoF, R&A, and RFFs projects to come on-line in FY92.
- E. Steam turbine chiller was not operated

APPENDIX IV

BASELINE FY94

1. Conversion Factors:      Electric = KWH x 11600 = BTU (10E9)  
   Natural Gas = Cu Ft x 1031 = BTU (10E9)
2. Excludes Navy and USDA.
3. Excludes any energy demand increases due to new business activities.
4. FY88 Baseline year.
5. - 2 shift operation  
     - 1459 HDD, 2510 CDD

ELECTRIC

KWH (000)	BTU (10E9)	REASON
122,250	1418.10	A
13,477	156.33	B
66	.77	C
500	5.80	D
37	.43	E
<u>7</u>	<u>.08</u>	F
136,337	1,581.5	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 93- Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on line throughout FY94.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY94.
- E. Electro-Dialysis Reversal (EDR) unit-estimated run time.
- F. Solvent Recovery-based on estimated run time.

APPENDIX IV

BASELINE FY94 (continued)

NATURAL GAS

Cu Ft (000)	BTU (10E9)	REASON
505,330	521.00	A
8,489	8.75	B
142	.15	C
1,600	1.61	D
<u>-36,576</u>	<u>-37.71</u>	E
478,985	493.8	

Reason Code:

- A. FY88 actual usage used as base.
- B. FY89 - 93 Equipment/projects added in previous years.
- C. Solvent Recovery, based on estimated run time.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY94.
- E. Steam turbine chiller not planned to be operated in FY94.

APPENDIX IV

BASELINE FY95

1. Conversion Factors:      Electric = KWH x 11600 = BTU (10E9)  
   Natural Gas = Cu Ft x 1031 = BTU (10E9)
2. Excludes Navy and USDA.
3. Excludes any energy demand increases due to new business activities.
4. FY88 Baseline year.
5. - 2 shift operation  
     - 1459 HDD, 2510 CDD

ELECTRIC

KWH (000)	BTU (10E9)	REASON
122,250	1,418.10	A
14,811	171.81	B
550	6.38	C
100	1.16	D
256	2.97	E
7	0.08	F
<u>137,974</u>	<u>1,600.50</u>	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89-94 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on line throughout FY95.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY95.
- E. Electro-Dialysis Reversal (EDR) unit-estimated run time.
- F. Solvent Recovery-based on estimated run time.

APPENDIX IV

BASELINE FY95 (continued)

NATURAL GAS

Cu Ft (000)	BTU (10E9)	REASON
468,754	483.29	A
8,489	8.75	B
142	.15	C
<u>600</u>	<u>.62</u>	D
477,985	492.81	

Reason Code:

- A. FY88 actual usage used as base.
- B. FY89 - 94 Equipment/projects added in previous years.
- C. Solvent Recovery, based on estimated run time.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY95.

APPENDIX IV

BASELINE FY96

1. Conversion Factors:      Electric = KWH x 11600 = BTU (10E9)  
                                     Natural Gas = Cu Ft x 1031 = BTU (10E9)
2. Excludes Navy and USDA.
3. Excludes any energy demand increases due to new business activities.
4. FY88 Baseline year.
5. - 2 shift operation  
     - 1459 HDD, 2510 CDD

ELECTRIC

KWH (000)	BTU (10E9)	REASON
122,250	1,418.10	A
15,218	176.53	B
200	2.32	C
150	1.74	D
256	2.97	E
<u>250</u>	<u>2.90</u>	F
138,068	1,601.59	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89-95- Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on line throughout FY96.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY96.
- E. Electro-Dialysis Reversal (EDR) unit-estimated run time.

APPENDIX IV

BASELINE FY96 (continued)

NATURAL GAS

Cu Ft (000)	BTU (10E9)	REASON
468,754	483.29	A
8,489	8.75	B
100	.10	C
<u>73,492</u>	<u>75.77</u>	D
550,835	567.91	

Reason Code:

- A. FY88 actual usage used as base.
- B. FY89 - 95 Equipment/projects added in previous years.
- C. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY96.
- D. Operation of the Thermal Oxidizers at Bldg. 318.

FY97 BASELINE GOALS

1. Conversion factors:      Electric - kwh x 11600 - BTU (10E9)  
                                    Natural Gas - CuFt x 1031 - BTU (10E9)
2. Excludes Navy and USDA
3. Excludes any energy demand increases due to new business
4. FY88 Baseline year  
    - 2 shift operation  
    - 1459 HDD, 2510 CDD

Electric

KWH(000)	BTU (10E9)	REASON CODE
122,250	1,418.10	A
16,691	193.62	B
100	1.16	C
500	5.80	D
250	2.90	E
139,791	1,621.58	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 96 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line throughout FY97.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY97.
- E. Electro-Dialysis Reversal (EDR) unit - estimated run time.

FY97 BASELINE GOALS

Natural Gas

CuFt(000)	BTU (10E9)	REASON CODE
468,754	483.29	A
8,489	8.75	B
100	0.10	C
75,000	77.33	D
552,343	569.47	

REASON CODE:

- A. FY88 actuals usage used as a base
- B. FY89-96 - Equipment/projects added in previous years
- C. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY97
- D. Estimated operations of the Thermal Oxidizers at Bldg. 318

FY98 BASELINE GOALS

1. Conversion factors:      Electric - kwh x 11600 - BTU (10E9)  
                                     Natural Gas - CuFt x 1031 - BTU (10E9)
2. Excludes Navy and USDA
3. Excludes any energy demand increases due to new business
4. FY88 Baseline year  
    - 2 shift operation  
    - 1459 HDD, 2510 CDD

Electric

KWH(000)	BTU (10E9)	REASON CODE
122,250	1,418.10	A
17,746	205.85	B
40	0.46	C
215	2.49	D
117	1.36	E
140,368	1,628.26	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 97 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line throughout FY98.
- D. Engineering estimate of CoF, R&A, and RFFs projects to come on-line in FY98.
- E. Electro-Dialysis Reversal (EDR) unit - estimated run time.

FY98 BASELINE GOALS

Natural Gas

CuFt(000)	BTU (10E9)	REASON CODE
468,754	483.29	A
8,489	8.75	B
0	0	C
62,287	64.22	D
539,530	556.26	

REASON CODE:

- A. FY88 actuals usage used as a base
- B. FY89-97 - Equipment/projects added in previous years
- C. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY98
- D. Estimated operations of the Thermal Oxidizers at Bldg. 318

FY99 BASELINE GOALS

1. Conversion factors:           Electric - kwh x 11600 - BTU (10E9)  
  Natural Gas - CuFt x 1031 - BTU (10E9)
2. Excludes USDA
3. Excludes any energy demand increases due to new business
4. FY88 Baseline year  
    - 2 shift operation  
    - 1459 HDD, 2510 CDD

Electric

KWH(000)	BTU (10E9)	REASON CODE
122,250	1,418.10	A
18,001	208.81	B
100	1.16	C
300	3.48	D
100	1.16	E
<hr/>		
140,751	1,632.71	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 98 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line throughout FY99.
- D. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY99.
- E. Electro-Dialysis Reversal (EDR) unit – hour meter run time.

FY99 BASELINE GOALS

Natural Gas

CuFt(000)	BTU (10E9)	REASON CODE
468,754	483.29	A
8,489	8.75	B
100	0.10	C
75,000	77.33	D
552,343	569.47	

REASON CODE:

- A. FY88 actuals usage used as a base.
- B. FY89-98 - Equipment/projects added in previous years.
- C. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY99.
- D. Thermal Oxidizers at Bldg. 318 – actual meter readings of Natural Gas usage.

FY2000 BASELINE GOALS

1. Conversion factors:           Electric - kwh x 11600 - BTU (10E9)  
                                      Natural Gas - CuFt x 1031 - BTU (10E9)
2. Excludes USDA
3. Excludes any energy demand increases due to new business
4. FY88 Baseline year  
    - 2 shift operation  
    - 1459 HDD, 2510 CDD

Electric

KWH(000)	BTU (10E9)	REASON CODE
122,250	1,418.10	A
18,153	211.60	B
100	1.16	C
300	3.48	D
100	1.16	E
140,903	1,635.50	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 98 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line throughout FY2000.
- D. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY2000.
- E. Electro-Dialysis Reversal (EDR) unit – hour meter run time

FY2000 BASELINE GOALS

Natural Gas

CuFt(000)	BTU (10E9)	REASON CODE
468,754	483.29	A
3,189	3.29	B
0	0	C
0	0	D
75,000	77.33	E
546,943	563.91	

REASON CODE:

- A. FY88 actuals usage used as a base.
- B. FY89-98 - Equipment/projects added in previous years.
- C. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY2000.
- D. Thermal Oxidizers at Bldg. 318 – actual meter readings of Natural Gas usage.

FY2001 BASELINE GOALS

1. Conversion factors:      Electric - kwh x 11600 - BTU (10E9)  
   Natural Gas - CuFt x 1031 - BTU (10E9)
2. Excludes USDA
3. Excludes any energy demand increases due to new business
4. FY88 Baseline year  
    - 2 shift operation  
    - 1459 HDD, 2510 CDD

Electric

KWH(000)	BTU (10E9)	REASON CODE
122,250	1,418.10	A
18,149	213.66	B
100	1.16	C
300	3.48	D
100	1.16	E
<hr/>		
141,169	1,637.56	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 00 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line throughout FY2001.
- D. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY2001.
- E. Electro-Dialysis Reversal (EDR) unit – hour meter run time

FY2001 BASELINE GOALS

Natural Gas

CuFt(000)	BTU (10E9)	REASON CODE
468,754	483.29	A
3,189	3.29	B
0	0	C
0	0	D
50,000	51.55	E
521,943	538.13	

REASON CODE:

- A. FY88 actuals usage used as a base.
- B. FY89-00 - Equipment/projects added in previous years.
- C. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY2001.
- D. Thermal Oxidizers at Bldg. 318 – actual meter readings of Natural Gas usage.

FY2002 BASELINE GOALS

1. Conversion factors:           Electric - kwh x 11600 - BTU (10E9)  
  Natural Gas - CuFt x 1031 - BTU (10E9)
2. Excludes USDA
3. Excludes any energy demand increases due to new business
4. FY88 Baseline year  
    - 2 shift operation  
    - 1459 HDD, 2510 CDD

Electric

KWH(000)	BTU (10E9)	REASON CODE
122,250	1,418.10	A
18,918	219.45	B
100	1.16	C
300	3.48	D
100	1.16	E
<hr/>		
141,668	1,643.35	

Reason Code:

- A. FY88 actual usage used as a base.
- B. FY89 - 01 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line throughout FY2002.
- D. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY2002.
- E. Electro-Dialysis Reversal (EDR) unit – hour meter run time.

FY2002 BASELINE GOALS

Natural Gas

CuFt(000)	BTU (10E9)	REASON CODE
468,754	483.29	A
3,189	3.29	B
0	0	C
0	0	D
35,000	36.09	E
506,943	522.67	

REASON CODE:

- A. FY88 actuals usage used as a base.
- B. FY89-01 - Equipment/projects added in previous years.
- C. Schedule A equipment scheduled to come on-line in FY2002
- D. Engineering estimate of CoF, R&A, and RFF projects to come on-line in FY2002.
- E. Thermal Oxidizers at Bldg. 318 – actual meter readings of Natural Gas usage.

ATTACHMENT J-15

TECHNOLOGY UTILIZATION/TRANSFER PROGRAM

Scope:

1.0 Pursuant to the provisions of Article H-37 of this contract, the Contractor shall provide for utilization and transfer of External Tank Technology developed under this contract (hereinafter "ET Technology") into the academia, public, and private entities. This program is designed to allow the Contractor to transfer and to provide consulting, design and development expertise for implementation of ET Technology, for public, private and governmental benefits.

1.1 All effort funded under this attachment will be authorized by Task Orders approved by the Contractor and the ET Project Manager. Each Task Order will be incorporated into the contract as identified below:

- Task 001 - Administration of Technology Utilization/Transfer
- Task 002 - Automated Robotic Workcell Development
- Task 003 - Compressor Girth Weld Enhancements
- Task 004 - Children's Lunchbox Meals
- Task 005 - Unitray Delivery Cart Thermal Curtain
- Task 006 - Kerner Industries Portable Refrigerator and Warmer
- Task 007 - Frymaster Frypot Weld Technology
- Task 008 - Kraft General Foods Thermal Protection Materials
- Task 009 - Licensing of MARCORE™ High Temperature Foam (ZHP168)

2.0 The initial task order shall describe in detail the scope of this effort, but in general the Contractor shall actively pursue the transfer of ET Technology by interacting with academia, public, and private entities. This interaction may include licensing.

3.0 NASA and the Contractor recognize and agree that it may be desirable from time to time to foster collaborative research at the NASA Michoud Assembly Facility (MAF) or for the Contractor to enter into joint ventures with third parties as means of implementing NASA's policy to effectively transfer ET Technology into the commercial market place. Where it is proposed to perform collaborative research at MAF or enter into joint ventures with third parties involving ET Technology, each agreement shall be negotiated on an individual basis, ensuring avoidance of any conflict of interest situation. The Contractor shall submit all collaborative research agreements or joint ventures, involving work at MAF to the Contracting Officer for approval, prior to finalization. This approval shall be detailed in a written task order. Explicit in such Contracting Officer approval, is authority to use all MAF services

such as, but not limited to, lab space, computer time, consumables and reproduction equipment.

4.0 Ownership of rights to technology developed under the agreements described in paragraph 3.0 above shall depend upon the source of funding for such and shall be specified in the individually negotiated agreements. In general, if the technology is developed by the Contractor with non-contract funds, the Contractor shall own the rights. If the technology is developed with funding from a third party, ownership of the rights shall be as determined between the Contractor and the third party. If the technology is developed with NASA contract funding, ownership to the rights shall be determined by the appropriate FAR or NFS clauses. NASA acknowledges that patent and other Intellectual Property rights are fundamental to the success of this program. As such, NASA agrees to use its best efforts to support this program by transferring commercial rights in NASA Owned Intellectual Property consistent with licensing, waiver and other regulations, laws, presidential directives, etc. governing the transfer of the Intellectual Property. The reasonable and allowable costs incurred by the Contractor, in performing collaborative research agreements and joint ventures shall be allowable costs hereunder in accordance with the provisions of the Contract Clause 52.216-7 entitled, "Allowable Costs and Payment".

5.0 The total effort contemplated for these tasks authorized under this attachment is (b)(4) total direct man hours. For reporting against the total direct man hours, one hour equates to (b)(4) which includes non-labor direct cost and applicable burdens.

5.1 Once the maximum number of direct man-hours for this program is reached and contract term has ended, the Contractor's requirements under the contract are fulfilled, even though the specified work may not have been completed. Nothing herein shall restrict the Contractor's expenditure of its own or non-direct funds to accomplish the purposes herein or similar purposes.

6.0 Licensing fees and other royalty revenues received by the Contractor from licenses of ET Technology shall be utilized to provide reimbursement to the contract until Government cost of (b)(4) has been offset. This reimbursement shall be in the form of credit billings to the contract on a semi-annual basis or more frequently if directed by the Government but not more frequently than monthly. The Contractor shall retain licensing fees, other royalties and revenues in excess of (b)(4)

7.0 If at any time during the performance of this contract, the Contractor has reason to believe that the equivalent man-hours of effort to be furnished will exceed the number of hours specified, the Contractor will notify the Contracting Officer and furnish with such notification, a new estimate of equivalent man-hours, and the parties to this contract may enter into negotiations to provide additional hours and for an equitable adjustment in the estimated cost and fee applicable to this Attachment.

ATTACHMENT J-16

ASRM SUPPORT

1.0 The Contractor shall perform the non-recurring effort associated with the facility modifications, Construction of Facilities, Acquisition of Contractor Acquired Property and demolition to support the ASRM at Michoud Assembly Facility as identified below.

2.0 Facility Modifications (excludes ASRM Consolidated Area demolition). Provide the labor, material/subcontract, engineering and administrative support for ASRM Facility Projects as follows:

1. Minor rehabilitation/modification/alteration projects that are under \$7,500 as required.

a. Expenditure report is submitted to the NASA External Tank Office at MAF on a quarterly basis.

2. In those instances where the projects are more than \$7,500 and less than \$100,000, Manned Space Systems:

- a. Submits formal transmittal letter including completed NASA Form 1509, for each project, to NASA for review, approval and contractual authorization to proceed.
- b. Makes investigations, studies, estimates, prepares design drawings, specifications and critical path planning and scheduling.
- c. In the case of a project involving a subcontract, complete the procurement process in accordance with government approved procurement procedures.
- d. Performs the necessary surveillance on each project, whether it is implemented by Manned Space Systems or subcontract personnel.

2.1 This section identifies the ASRM Facility Modifications required to prepare the Building 103 Consolidated Area for ASRM occupancy.

2.1.1 Provide access road and ramps, West Dock, Building 220.

2.1.2 Provide restrooms for Building 104.

2.1.3 Provide utilities for Facilities support shop, Building 131, Cell "M".

- 2.1.4 Enclosed area for Facilities Analytical Shop, Building 103, Column H-17.
- 2.1.5 Provide a Weld and Rivet Training Facility, Building 103, South Mezzanine.
- 2.1.6 Prepare area for Bulk Material Commodities Storage, Building 103, Column M-8/10.
- 2.1.7 Prepare area for Tooling Raw Material Storage and Tool Control, Building 103, Column P-7.
- 2.1.8 Prepare area Modifications for Receiving Facility, Building 220.
- 2.1.9 Prepare area Modifications for Shipping Facility, Building 220.
- 2.1.10 Provide area Modifications for Receiving Inspection Facility, Building 220.
- 2.1.11 Provide area for Mechanical SCC and Tool Control Crib, Building 103.
- 2.1.12 Provide a building for Roads and Grounds Personnel and Equipment.
- 2.1.13 Provide area for Tool Inspection and Tool Fabrication Storage, Building 103.
- 2.1.14 Install a floor-to-ceiling curtain enclosure around the ASRM area to provide perimeter dust control for both ET and ASRM project demolition and construction activities within the Consolidated Area.
- 2.1.15 Perform Building 103 Geotech Borings (16)/Engineering Borings (6)/LSC Geotech Borings (3).
- 2.1.16 Facility modifications to support the south mezzanine relocation.
- 2.1.17 Perform Michoud Assembly Facility Baseline Environmental Assessment for ASRM which consists of approximately 7 groundwater monitoring wells (6 are temporary) and soil samples at one of the borings for Building 103 and approximately 3 groundwater wells and 3 soil borings for Building 411.

2.1.18 Provide the Environmental Management, Industrial Hygiene and Industrial Safety services required during construction of test piles and test pits in the ASRM area.

3.0 Construction of Facilities - Perform planning and administration support for the Construction of Facilities Projects as identified in Contract NAS8-36747(F), Attachment J-3-A, and NAS8-39243(F). This activity may include but is not limited to planning, budgeting, scheduling, identification of detail facility requirements; detail plant layout, feasibility studies, developing design criteria, selection and management of A&E, design, design reviews, site investigation and SIES.

4.0 Contractor Acquired Property - Perform engineering in support of plant equipment for demolition and relocation in support of the ASRM Project (general purpose and having an installed cost greater than \$500) including the development equipment requirements and specifications, obtaining and evaluating vendor quotes, supervisor of equipment and performance checkout, preparation of maintenance requirements and equipment management as identified in Contract NAS8-36747(F), Attachment J-1-A, and NAS8-39243(F).

5.0 The Demolition effort to prepare Consolidated Area shall be performed under Contract NAS8-36747(F), Attachment J-6, and NAS8-39243(F). All other labor to support demolition shall be performed under this Attachment.

6.0 This Scope of Work does not include any effort associated with the ASRM project as a tenant as identified in MMC -ET-MA73-1, Paragraph 3.0.I-B at MAF. The effort associated with the ASRM project as a tenant will be the subject of a separate contract modification.

ATTACHMENT J-17  
SUPER LIGHTWEIGHT EXTERNAL TANK  
NON-RECURRING EFFORT

1.0 REQUIREMENTS

1.1 The contractor will furnish all the effort, materials, tooling, equipment, hardware, facilities, services and management (except as specified to be provided by the Government as referenced in Attachment j-4 of this contract "Government Provided Facilities, Property and Services") required to achieve the specification weight reduction by utilizing material substitution and optimizing design in accordance with the requirements baselined by the SLWT End Item Specification - Appendix "40" to NAS8-36200: DPD 660 Document Number MMC-ET-CM02 CPTO1MO9A (Part I).

1.2 The ability to provide this weight reduction is based on current induced environments with anticipated Super Lightweight (SLWT) effects only. Changes reflecting other performance enhancements or mission profile changes that exceed those anticipated for SLWT alone are considered out of scope.

1.3 This Attachment identified the non-recurring scope of work required to achieve this weight reduction on first SLWT External Tank and subsequent External Tanks. The following are specifically excluded from this attachment and will be included as part of the scope of Attachment J-1, paragraph 2.2.

- LWT subcontract procurement termination costs
- Procurement of unique LWT production spares necessary to protect LWT production activities through the last Lightweight External Tank
- Escalation costs for replacement of SLWT Test Hardware
- Lot to Lot Acceptance Testing on first SLWT External Tank & Subsequent AL 2195 Material
- All work performed on the first and subsequent SLWT Tanks
- Engineering Change Proposal (ECP) preparation activities

## 2.0 SLWT WEIGHT BASELINE

2.1 The specification weight shall be as reflected in paragraph 3.2.1.1.3 to Appendix 40 of NAS8-36200 DPD 660 document number MMC-ET-CM02 "External Tank End Item Specification" and will be maintained to incorporate NASA initiated engineering changes that impact the contract weight of the SLWT configuration and are outside of the SLWT baseline.

2.2 The SLWT Weight Baseline for ET-96 will be verified by analysis, reported as "Predicted Weight" in the Mass Properties Status Report (Contract NAS8-36200: DPD 660 document number MMC-ET-SE02) as opposed to physically weighing for evaluation against the External End Item Specification MMC-ET-CM02.

2.3 Contractor initiated "no cost" or Cost Savings" changes between ET-71 and ET-96 External Tank will be considered part of the "SLWT Weight Baseline" and will not adjust the specification weight.

2.4 Government initiated changes between ET-71 and ET-96 which impact weight will change the specification weight baseline of ET-96 and will adjust the specification weight.

2.5 Contractor initiated changes which enhance the Shuttle "payload to orbit" performance capability will be part of the "SLWT Weight Baseline" when measuring contractor "Weight Reduction Performance Criterion" as specified in Attachment J-18 "Award and Performance fee for the Super Lightweight Tank Non-recurring Program".

2.5.1 The weight equivalent effect of such changes, shall be titled "Payload to Orbit performance Delta", shall be proposed by a contractor initiated Engineering Change proposal (ECP), and be mutually agreed by the parties and documented in the following Table 2.5.1.1:

TABLE 2.5.1.1

<u>ECP</u>	<u>Payload to Orbit Performance Delta</u>	<u>ET Effectivity</u>
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2.5.2 The SLWT Weight Baseline shall be calculated by the following equation:

"SLWT Weight Base" Equation:

"Predicted Weight of ET-96"	minus (-)	"Payload to Orbit Performance Delta"	Equals (=)	"SLWT Weight Baseline"
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2.0 SLWT WEIGHT BASELINE (Continued)

2.5.3 "SLWT Weight Baseline" Example Calculation:

Example Table 2.5.1.1

<u>ECP</u>	Payload to Orbit Performance <u>Delta</u>	ET <u>Effectivity</u>
B01XXXX	300 pounds	ET-96

Example Calculation:

"Predicted Weight of ET-96"	minus (-)	"Payload to Orbit Performance Delta"	Equals (=)	"SLWT Weight Baseline"
57,796 pounds	minus (-)	300 pounds	Equals (=)	57,496 equivalent pounds

### 3.0 DEVELOPMENT PROGRAM

3.1 A material characterization test program will be performed to generate the minimum mechanical properties for use in SLWT design. The requirement for testing of Al 2195 specimens may originate from various program technical requirements. In general, the originating requirement will govern that part of the contract the performance of the test is accountable to.

3.2 Material lot acceptance criteria has been established based on preliminary minimum design properties. Engineering drawings shall be released and hardware will be produced based on lot acceptance criteria approved by NASA and defined in the applicable released material specifications.

3.3 The contractor shall be responsible for all required material property testing as defined in PCP B81357-R1 for parent metal material characterization and welded metal allowables with the exception of the tests to be performed by NASA. NASA will provide the test fixtures, conduct the test, and provide the test data in accordance with NAS8-36200 Section J-4 titled "Government Provided Facilities, Property and Services".

3.4 Process development for SLWT includes processes associated with welding, forming and joining of hardware and heat treatment practices. Weld schedule development will be performed by the contractor personnel with NASA participation. The planned non-destructive evaluation (NDE) shall be performed by the contractor at the MSFC facility. NASA will provide the test fixtures, test set-up drawings, conduct the test, and provide the test data in accordance with NAS8-36200, Section J-4 titled "Government Provided Facilities, Property and Services". The contractor shall provide the analysis, the test plan, the test specimen drawings, the test specimens, and the test report for all SLWT development tests listed in NAS8-36200, Section J-4, "Government Provided Facilities, Property and Services".

3.5 Surplus material provided by Attachment J-1 or J-6 of NAS8-36200 may be re-allocated for use on this development program.

3.6 The development program may utilize material provided by Special Development Study 3315 "Al-Li Material Investigation", which is surplus material or which may be subsequently procured for this purpose.

3.7 Lot acceptance testing shall be performed on A1 2195 material in accordance with the requirements specified in MMC-ET-SE59 "A1 2195 Lot Acceptance Test Methods and Requirements".

3.8 Enhanced NDE inspection (Class II type inspection per STP 2507) shall be performed for A1 2195 LO2 and LH2 pressure wall component structures until sufficient data is available to eliminate the requirement as follows:

a) on all pressure vessel components for an equivalent of 4 SLWT flight article shipsets of material;

b) for an additional equivalent of 5 SLWT flight article shipsets of material, the scope is reduced to performing enhanced shipsets of material, the scope is reduced to performing enhanced NDE on inadequately proofed pressure vessel components only

c) for all other material, NDE inspection is scoped equivalent to current A1 2219 requirements.

Enhanced NDE inspection on material beyond the above stated scope shall be subject to separate contractual action.

#### 4.0 SLWT VERIFICATION AND QUALIFICATION

4.1 The SLWT will be verified according to the requirements baselined by the Super Lightweight External Tank Verification Plan - Appendix "E" to NAS8-36200 DPD 660 Document Number MMC-ET-TM01. Six primary methods and approaches will be used to satisfy the structural verification requirements of the SLWT. These six methods and approaches are: (1) component development tests, (2) Aluminum Lithium Test Article (ALTA) load testing at room temperature, (3) LH2 and LO2 tank Flight Article proof tests, (4) 115% limit load LH2 tank proto-flight testing, (5) analysis, and (6) inspection and similarity.

#### 4.2 STRUCTURAL COMPONENT DEVELOPMENT TESTS

4.2.1 The contractor shall perform structural component development testing as part of the SLWT structural verification plan with the exception of the tests to be performed by the NASA. NASA will provide the test fixtures, test set up drawings, conduct the test, and provide the test data in accordance with NAS8-36200 Section J-4 titled "Government Provided Facilities, Property and Services". The contractor shall provide the analysis, the test plan, the test specimen drawings, the test specimen, and the test report for all SLWT development tests listed in NAS8-36200 Section J-4 "Government Provided Facilities, Property and Services".

#### 4.3 ALUMINUM LITHIUM TEST ARTICLE (ALTA)

4.3.1 The contractor will design and manufacture an Aluminum Lithium Test Article (ALTA) as identified in paragraph 4.3.3 below. The ALTA will be manufactured using ET tooling modified as required for SLWT production. The ALTA will be delivered at MAF (DD-250) for shipment to MSFC by unmanned barge on a modified ET Transporter. Subsequent to ALTA DD-250 acceptance by the Government, the contractor will provide and install at MSFC the instrumentation required for the structural test at MSFC Bldg. 4699. The ALTA will be outfitted for room temperature load testing at MSFC.

4.3.2 The ALTA test plan shall be in accordance with the test requirements defined by the Super Lightweight External Tank Verification Plan -Appendix "E" to NAS8-36200: DPD 660 Document Number MMC-ET-TM01.

4.3.3 The ALTA configuration shall be according to the requirements baselined by the ALTA End Item Specification - Addendum "A" to NAS8-36200 DPD 660 Document Number MMC-ET-CM02 CPT01M09A (Part I).

4.3.4 The ALTA test program will be performed at MSFC in accordance with the ALTA Test Responsibility Matrix defined in ECP B01982A-R2.

4.3.5 The Contractor will furnish the design installation drawings, the installation hardware and the labor for mating ALTA to the upper and lower simulators at the test site. NASA will provide the simulators, the access tooling, transportation for ALTA movement and overhead cranes as required in accordance with the NAS8-36200 Attachment J-4 titled, "Government Provided Facilities, Property and Services".

#### 4.4 MATERIALS AND PROCESS VERIFICATION

The contractor shall perform materials verification testing to the requirements baselined by the Super Lightweight External Tank Verification Plan - Appendix "E" to NAS8-36200 DPD 660 Document Number MMC-ET-TM01, with the exception of those test to be performed by NASA. The contractor shall provide the analysis, the test plan, the test specimen drawings, the test specimens, and the test report for all tests listed in NAS8-36200, Section J-4 "Government Provided Facilities, Property and Services". NASA will provide the test fixtures, test set up drawings, conduct the test, and provide the test data in accordance with Section J-4 "Government Provided Facilities, Property and Services". Current LWT processes and procedures are baselined for the material verification program.

#### 4.5 COMPONENT QUALIFICATION AND CERTIFICATION

The contractor shall perform component structural qualification tests and vibration tests driven by the SLWT design with the exception of the tests to be performed by the NASA. The contractor shall provide the analysis, the test plan, the test specimen drawings, the test specimens, and the test report for all SLWT tests listed in NAS8-36200, Section J-4, "Government Provided Facilities, Property and Services". NASA will provide the test fixtures, test set up drawings, conduct the test, and provide the test data in accordance with Attachment J-4, "Government Provided Facilities, Property and Services."

#### 4.6 SLWT TANKING AND DE-TANKING TEST AT KSC

A tanking/de-tanking test will be performed at the Kennedy Space Center launch pad on the first SLWT scheduled for flight. NASA shall be responsible for conducting this test and providing test data to the contractor. The contractor will provide the test analysis, the test plan, and the test report. Instrumentation to obtain the Frame 2058 pinch loads is furnished by the SRB and is mounted on the SRB struts. No additional instrumentation is required to be provided by the contractor.

#### 5.0 MAJOR PROJECT REVIEWS

The contractor shall support major project reviews associated with the SLWT design and development phase which include:

- ALTA Design Review (ADR)
- SLWT Preliminary Requirements Review (PRR)
- Preliminary Design Review (PDR)
- Critical Design Review (CDR)
- Design Certification Review (DCR)

All design reviews shall be performed in accordance with the plan identified in ECP B01982A-R2. The contractor will continue to support other Project Reviews as necessary.

#### 6.0 LIGHT WEIGHT EXTERNAL TANK (LWT) TOOLING CAPABILITY

This attachment does not include the requirements to change engineering documentation for a return to LWT production beyond ET-96. However, if a SLWT design change drives a tool modification which renders the tool incapable of producing the Lightweight configuration, a replacement SLWT tool will be provided and the LWT tool retained in storage.

ATTACHMENT J-18  
TECHNICAL PERFORMANCE INCENTIVE FEE FOR SUPER LIGHTWEIGHT EXTERNAL  
TANK NON-RECURRING PROGRAM

1.0 The Super Lightweight External Tank Non-recurring effort is established in Attachment J-17 of this contract. This Attachment defines the Performance Incentive Fee measurements which will be used to determine the contractor's performance against the established Technical Performance Incentives.

2.0 The Performance Incentives - Target Goals

The contractor's performance will be evaluated in terms of the following three Technical performance Incentive Target Goals which are defined in subsequent subparagraphs:

- a. Weight Technical Performance
- b. Schedule Technical Performance
- c. Special Technical Performance

2.1 Weight Technical Performance Incentive - Target Goal

Weight Technical Performance  
Incentive Fee Amount Allotted

Previous Amount	\$3,651,048
This Mod.	<u>2,964</u>
Total Amount	\$3,654,012

The Weight Technical Performance Incentive Target Goal is for the contractor's effectiveness in achieving the SLWT Weight Baseline of ET-96 as defined in paragraph (a) below. The contractor's performance and percentage of the Weight Technical Performance Incentive Fee earned will be determined based on the following:

(a) Specification Weight Identified in Attachment J-17, paragraph 2.1 minus the SLWT Weight Baseline weight identified in Attachment J-17, Paragraph 2.5.2 equals pounds over/under Specification Weight.

(b) The contractor will earn the Weight Technical Performance Incentive Fee if the SLWT Weight Baseline for ET-96 is equal to or less than the Specification Weight of ET-96. The Weight Technical Performance Incentive Fee will be decreased by \$1,095.31 for every pound over Specification Weight as determined in Paragraph (a) above up to 500 pounds. If the SLWT Weight Baseline of ET-96 exceeds the Specification Weight of ET-96 by more than 500 pounds no Technical Performance Incentive Fee for weight will be earned.

## 2.2 Schedule Technical Performance Incentive Target Goal

### Schedule Performance Incentive Fee Amount Allotted

	<u>ALTA DD-250</u>	<u>ET-96 DD-250</u>	<u>TOTAL</u>
Previous Amount	\$1,846,876	\$1,846,877	\$3,693,753
This Mod.	< 21,352 >-	< 21,353 >	< 42,705 >
Total Amount	\$1,825,524	\$1,828,488	\$3,651,048

The Schedule Performance Delivery (DD-250) milestone date for ALTA and ET-96 are established in Attachment J-5 - Delivery Schedule of the contract.

### 2.2.1 ALTA Schedule Technical Performance Incentive Target

The contractor will earn the Schedule Technical Performance Incentive for the Delivery of ALTA on the delivery date specified for ALTA in Attachment J-5. The Schedule Technical Performance Incentive fee will be decreased for delivery later than the specified date according to the table provided below.

<u>ET-96 Delivery (DD-250) Date</u>	<u>Amount Schedule Performance Incentive Fee Decreased by</u>
1-8 Days Late	\$ 91,276
9-15 Days Late	\$ 182,552
16-22 Days Late	\$ 365,105
23-29 Days Late	\$ 547,657
30-36 Days Late	\$ 730,210
37 Days Late or Greater	\$1,825,524

### 2.2.2 ET-96 Schedule Technical Performance Incentive Target Goal

The contractor will earn the Schedule Technical Performance Incentive fee for the Delivery of ET-96 on or within four (4) days of the delivery date specified for ET-96 in Attachment J-5. The Schedule Performance incentive fee will be decreased for delivery later than four days according to the table provided below.

<u>ET-96 Delivery (DD-250) Date</u>	<u>Amount Schedule Performance Incentive Fee Decreased by</u>
5-9 Days Late	\$ 182,552
10 Days Late	\$ 365,105
11-15 Days Late	\$ 912,762
16-20 Days Late	\$1,004,038
21-25 Days Late	\$1,095,314
26-30 Days Late	\$1,186,591

31-35 Days Late	\$1,277,867
36-40 Days Late	\$1,369,143
41-45 Days late	\$1,460,419
46-50 Days Late	\$1,551,695
51-55 Days Late	\$1,642,792
56-60 Days Late	\$1,734,248
61 Days Late or Greater	\$1,825,524

2.3 Special Technical Performance Incentive Target Goal

Special Technical Performance  
Incentive Fee Amount Allotted

Previous Amount	\$0
This Mod.	\$3,000,000
Total Amount	\$3,000,000

2.3.1 In addition to the Technical Performance Incentive for Target Goals for Weight and Schedule Performance identified above, the contractor shall be paid an additional Special Technical Performance Incentive Fee if all the following criteria are met:

(a) The successful separation of ET-96 at the designated orbit as defined in paragraph 2.3.2 below; and

(b) The Super Lightweight External Tank Weight Baseline for ET-96 is equal to or less than the Specification Weight of ET-96; and

(c) The Cost for the non-recurring effort identified in Attachment J-17 does not exceed the Target Cost plus \$2 million; and

(d) The schedule delivery date (DD-250) of ET-96 is not greater than ten calendar days late.

2.3.2 Successful Separation of ET-96 for the Special Technical Performance Incentive Fee is defined as follows:

(a) The Shuttle Orbiter to which ET-96 is assigned achieves the planned orbit.

(1) If the planned orbit is not achieved and the cause of the failure is ET-96 and attributable to the fault of the contractor, the Performance Incentive Fee will not be earned.

(2) In the event the planned orbit is not achieved and the failure to achieve the planned orbit is not caused by the performance of ET-96, the criteria for Successful Separation will be considered achieved.

(b) In the event ET-96 is not able to perform an assigned mission at no fault of the ET and contractor, the criteria for Successful Separation will be considered achieved.

3.0 Provisional Payments and Payment of Earned Technical Performance Incentive Fee

(a) Provisional Payments of 80% of the Technical Performance Incentive Fee will be made on a monthly basis in accordance with the provisions outlined below. Payment of Earned Technical Performance Incentive Fee will be made based on the following and provisions identified in Paragraph 2.0 above.

(1) Weight Technical Performance Incentive Fee - Provisional Payment

(a) Sub Milestone - At CDR ET-96 Predicted Weight published in the CDE Package is within 300 pounds of the Specification Weight - Period of performance February, 1994 through June, 1995 (17 months) value is \$2,223,000.

The sub milestone shall be measured subsequent to the CDR Board Meeting When there are no open Review Item Discrepancies (RIDs) addressing the calculation method of the ET-96 Predicted Weight.

The contractor will receive monthly provisional payment or 80% of the Sub Milestone Value divided by 17. The balance due will be paid upon completion of the sub milestone.

(b) Milestone - SLWT Baseline Weight compared to the Specification Weight - Period of Performance July, 1995 through September, 1997 (27 months) Value is \$1,428,048.

The contractor will receive monthly provisional payment of 80% of the Milestone Value divided by 27. The balance will be earned and paid on completion of the milestone in accordance with the provisions of Paragraph 2.1 above.

(2) Schedule Technical Performance Incentive Fee - Provisional Payment

(2.1) ALTA Schedule Performance

(a) Sub Milestone - Dome and Barrel Drawings Complete - Period of Performance February, 1994 through June, 1995 (17 months) Value is \$463,125.

The contractor will receive monthly provisional payment of 80% of the Sub Milestone Value divided by 17. The balance due will be paid upon completion of the sub milestone.

(b) Sub Milestone - Barrel Assembly Manufacturing Complete - Period of Performance July, 1995 (1 month) Value is \$463,125.

The contractor will receive monthly provisional payment of 80% of the Sub Milestone Value divided by 1. The balance due will be paid upon completion of the sub milestone.

(c) Milestone - DD-250 of ALTA - Period of Performance August, 1995 through December, 1995 (5 months) Value is \$899,274.

The contractor will receive monthly provisional payment of 80% of the Milestone Value divided by 5. The balance will be earned and paid upon completion of the milestone in accordance with the provisions of Paragraph 2.2.1 above.

(2.2) DD-250 of ET-96 Schedule Performance

(a) Sub Milestone - Complete Casting and Rolling - Period of Performance February, 1994 through August, 1995 (19 months)a Value is \$370,500

The contractor will receive monthly provisional payment of 80% of the Sub Milestone Value divided by 19. The balance due will be paid upon completion of the sub milestone.

(b) Sub Milestone - Dome/Barrel Sub assembly Manufacturing Complete - Period of Performance September, 1995 through March, 1996 (7 months) Value is \$555,750.

The contractor will receive monthly provisional payment of 80% of the Sub Milestone Value divided by 7. The balance due will be paid upon completion of the sub milestone.

(c) Sub Milestone - LH2/LO2/Intertank Manufacturing Complete - Period of Performance April, 1996 through January, 1997 (10 months) Value is \$463,125.

The contractor will receive monthly provisional payment of 80% of the Sub Milestone Value divided by 10. The balance due will be paid upon completion of the sub milestone.

(d) Milestone - DD-250 of ET-96 - Period of Performance February, 1997 Through September, 1997 (8 months) Value is \$436,149.

The contractor will receive monthly provisional payment of 80% of the Milestone Value divided by 8. The balance will be earned and paid upon completion of the milestone in accordance with the provisions of Paragraph 2.2.2 above.

(b) The Special Technical Performance Incentive fee will paid in December, 1997 based on the Achievement of the target goals as identified in paragraph 2.0 subparagraph 2.3 above. Should the launch of ET-96 be delayed beyond December 1997 due to no fault of the contractor the government will provisionally pay 80% of the Special Technical Performance Incentive fee. The balance will be payable upon the launch of ET-96 and the achievement of the target goals as identified in paragraph 2.3 or upon identification that the provisions of paragraph 2.3.2 (b) will be applicable.

(c) The Contractor's fee vouchers must contain separate calculations supporting the billing for provisional payment.

(d) The contractor shall submit in writing to the Contracting Officer a letter identifying that the Technical Incentive Performance Milestone(s) has been met as identified in Paragraph 2.0 above and voucher for payment. Normally the Government shall pay the fee to the Contractor as specified in paragraph (a) above. However, when the Contracting Officer considers that performance indicates that the contractor will not achieve the target goals, the Government shall pay on the basis of an appropriate lesser fee.

(e) At the completion of the period of performance for the non-recurring Super Lightweight Tank effort, the total Technical Performance Incentive fee earned will be calculated based on the final performance objective as identified in paragraph 2.0 above regardless of performance on the sub milestones. Based on this total amount earned, an adjustment, upward or downward of the payments to an amount equal to the Technical Performance Incentive Fee earned will be determined. In the event an overpayment is determined as a result of this final calculation, the overpayment will be deducted from any remaining cost or fee owed, or reimbursed by the contractor.

End Attachment J-18

**ATTACHMENT J-19**  
**PROCUREMENT OF BUY 6 FLIGHT HARDWARE**

**Attachment J-19 has been deactivated and transferred in its entirety to External Tank Buy 6 Contract NAS8-00016 via Modification No. 577.**

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

**Attachment J-19**

**PROCUREMENT OF BUY 6 FLIGHT HARDWARE**

**SECTION B**

**SERVICES**

1. The contractor shall initiate the Procurement of Buy 6 Flight Hardware, issue the purchase agreements to subcontractors, and perform related effort in support of purchasing and subcontract procurement actions for the material as identified in Section C, Descriptions/ Specifications/ Statement of Work of this attachment.
2. **ESTIMATED COST AND CONTRACT FEES**

The estimated cost and fees for performance of the statement of work identified in this Attachment J-19 is as follows:

	<b>Target Cost</b>	<b>Target Fee</b>	<b>Performanc e Incentive Fee</b>	<b>Special Sustained Performance Fee</b>	<b>Contract Value</b>
Previous	\$79,700,000	\$ 2,510,550	\$ 3,068,450-	\$398,500	\$85,677,500
This Action	\$582,000,000	\$18,333,000	\$22,407,000	\$2,910,000	\$625,650,000
Total	\$661,700,000	\$20,843,550	\$25,475,450	\$3,308,500	\$711,327,500

3. **FEE PROVISIONS**
  - A. Performance Incentive Fee provisions are established for the following categories of performance measurement and earning determination.
    - (1) The following table breaks down the Performance Incentive fee pools by measurement period:

(Go to next page)

Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577

Period Ending	SB	SDB	On Time Parts	Supplier Quality	Total Pool Available
9/1999			\$695,171	\$695,171	\$1,529,376
3/2000			\$543,240	\$543,240	\$1,195,127
9/2000			\$497,784	\$497,784	\$1,095,126
3/2001			\$748,179	\$748,179	\$1,645,995
9/2001			\$924,541	\$924,541	\$2,033,991
3/2002			\$794,055	\$794,055	\$1,746,922
9/2002			\$733,366	\$733,366	\$1,613,409
3/2003			\$776,028	\$776,028	\$1,707,262
9/2003			\$859,098	\$859,098	\$1,890,016
3/2004			\$779,837	\$779,837	\$1,715,642
9/2004			\$716,055	\$716,055	\$1,575,321
3/2005			\$632,512	\$632,512	\$1,391,527
9/2005			\$559,352	\$559,352	\$1,230,575
3/2006			\$490,982	\$490,982	\$1,080,160
9/2006			\$422,611	\$422,611	\$ 929,744
3/2007			\$402,929	\$402,929	\$ 886,444
9/2007			\$383,247	\$383,247	\$ 843,143
3/2008			\$267,865	\$267,865	\$ 589,303
9/2008			\$267,865	\$152,864	\$ 336,300
3/2009			\$138,231	\$138,231	\$ 304,109
9/2009			\$ 61,799	\$ 61,799	\$ 135,959
<b>Total</b>	<b>\$</b>		<b>\$11,579,750</b>	<b>\$11,579,750</b>	<b>\$25,475,450</b>

- (2) Performance Incentive Fee measurement periods shall be established as follows:
- The first incentive measurement period shall be for the period: Commencement of contract through 30 September 1999.
  - Subsequent incentive measurement periods shall be for subsequent six month periods (October 1<sup>st</sup> through March 31<sup>st</sup> and April 1<sup>st</sup> through September 30<sup>th</sup>, of each respective GFY) through the period ending 30 September 2009.
- (3) All Performance Incentive Fee measurement criteria are calculated on the total Flight Hardware Procurement Effort.
- (4) Contractor earned fee shall not exceed 15% of Target Cost as a result of the incentive fee provision contained herein.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

- B. The following criteria is established for the measurement of the amount the contractor shall earn for the Performance Incentive Fee categories established above:

(b)(4)

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

(b) (4)

(3) On-Time Parts Availability for Production Issuance Performance:

- a. Parts shall be considered on time based on the calculation in paragraph (3) b. Data Requirement MA-90, issued at the close of each fee period shall be the auditable basis for those payments made under these provisions.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

- b. The measurement shall be calculated as follows:

$$\frac{\text{Scheduled Releases Minus Scheduled Releases w/out All Parts Received the Day of Release}}{\text{Scheduled Releases}}$$

- c. The average successful scheduled parts release percentage for each six month measurement period shall be calculated by dividing the six month total Scheduled Releases Minus Scheduled Releases without All Parts Received the Day of Release by the Scheduled Releases for the six month period. Such calculation shall be made against the Buy 6, total flight hardware procurement effort.
- d. The calculation of performance incentive fee earned shall be performed by applying the six month average performance as calculated above as follows:

% Incentive Fee Earned	% Complete Releases
100%	=or >90%
0%	<90%

**(4) Supplier Quality Performance:**

- a. Supplier Quality shall be measured on the basis of the number of parts received which have not had a non-conformance.
- b. Measurement shall be calculated for the fee period as follows:

$$\frac{\text{Number of Parts Received without a Non-Conformance (*)}}{\text{Total Number of Parts Received (**)}}$$

(\*) As reported on Lockheed Martin Form MAF/MMA-37-033 (Non-Conformance Document) and/or MAF/MMA-37-033A (Non-Conformance Item Data)

(\*\*) Quantity of parts received derived from Walker System Report MMWKR211 and quantity of parts with non-conformances are derived from Form MAF/MMA 37-033 and 37-033A, Block 5.

- c. Parts to be measured shall include, and are limited to:
- (i) 809 (Lockheed Martin Design parts) designated parts
  - (ii) Producer Design (PD) parts
  - (iii) Standards, exclusive of fasteners
  - (iv) All Sheet and Plate materials are excluded
- d. The average Supplier Quality percentage for each six-month measurement period shall be calculated by dividing the six-month total number of parts received with no non-conformances by the six-month total number of parts received.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

- e. The calculation of incentive fee earned shall be calculated by applying the six month average performance as calculated above as follows:

% Incentive Fee	Parts	
	<u>Received Through 9/2000</u>	<u>Without a Non-Conformance Thereafter</u>
100%	=or >93%	=or >95%
90%	=or >86%-92.9%	=or >88%-94.9%
0%	<86%	<88%

**C. Special Sustained Superior Performance Incentive Provisions**

- (1) In addition to the Target Fee, Performance Incentive Provisions and Cost Incentive Provisions identified above, the Contractor shall be eligible to earn Sustained Superior Performance Incentive Fee as defined below.
- (2) By achieving both a cumulative On Time Parts Availability performance and a cumulative Quality Supplier performance, over an annual period of performance (GFY), equating to =or >90% and =or >93% respectively for FY99 and FY00, and =or >90% and =or >95% respectively for the remaining years, the Contractor shall earn fees and can not forfeit such fee per the following table:

GFY	Fee Pool Available
9/1999	\$198,620
9/2000	\$297,435
9/2001	\$477,920
9/2002	\$436,407
9/2003	\$467,179
9/2004	\$427,398
9/2005	\$340,533
9/2006	\$261,027
9/2007	\$224,622
9/2008	\$120,208
9/2009	\$ 57,152
<b>Total</b>	<b>\$3,308,500</b>

For any annual period where Special Sustained Superior Performance Incentive Fees are not earned, that annual GFY period's fee pool shall be forfeited.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

- (3) The first measurement period, indicated as GFY1999 above, shall be based on the cumulative rating from the inception of the 6<sup>th</sup> Buy, total flight hardware procurement effort through September 30, 1999.

**D. Cost Incentive Provisions**

- (1) The provisions of FAR 52.216-10 -Incentive Fee as contained in NASA Contract NAS8-36200 shall govern.
- (2) Cost incentive fee under Attachment J-19 of this contract shall be the Target Fee: (1) Increased by Forty (40) cents for every dollar that allowable cost is less than Target Cost, or (2) Decreased by Seventy-Five (75) cents for every dollar that allowable cost is in excess of Target Cost. In no event shall Target Fee be less than zero (\$0) dollars.

**4. CONTRACT FUNDING (18-52.232-81)(JUN 1990)**

For purposes of payment of cost pursuant to the Limitation of Funds clause, the total amount allotted by the Government allotted for payment of cost and fees associated with this Attachment J-19 are included in the total funds contained in this Attachment J-19 as follows:

- (a) For purposes of payment of cost, exclusive of fee, in accordance with the Limitation of Funds clause, the total amount allotted by the Government to this contract is \$123,223,000. This allotment is for cost and covers the following estimated period of performance: September 16, 1997 through September 27, 2000.
- (b) An amount of \$8,019,000 is obligated under this contract for fee.

**5. COST COLLECTION**

All costs and fees associated with Attachment J-19 of this contract shall be collected, reported and invoiced separately from the remainder of this contract. Contractor cost vouchers for reimbursement of allowable costs shall be submitted in accordance with the payment and cost principals of this contract. For purposes of this Attachment the date is established as September 16, 1997, which corresponds to the authorized date for recognition of costs for procurement of the Buy 6 flight hardware.

**6. DEPENDENCY ON BUY 6 MANUFACTURING**

Direct labor required for this effort will be charged in accordance with the methodology established in Contract NAS8-36200, Attachment J-1, Paragraph 2.4 "Allocation of Cost Agreement". The Contractor reserves the right to negotiate an equitable adjustment for labor/support charges should the External Tank Buy 6 not be awarded within the appropriate time frame.

**7. PROVISIONAL BILLING FOR PERFORMANCE INCENTIVE FEE**

The Contractor shall be authorized monthly provisional fee billings at the rate of 80% of the fee pool for each incentive fee and performance fee pool. Should the provisional fee billings exceed that amount due the Contractor, such amounts shall be deducted from the next provisional fee billing(s) until the overpayment is repaid.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

**8. EXCLUSIONS**

Costs normally proposed based on Flight Hardware cost have been excluded from the Target Cost indicated in this Attachment J-19, as follows:

- A. Scrap and Rework
- B. Consumables and Expendables
- C. Test Panel Materials

These costs are historically proposed as a part of direct production costs. They will be considered in a separate contractual action.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

**SECTION C**

**DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK**

**8. WORK STATEMENT**

A. The contractor shall, on the terms and conditions hereinafter more particularly set forth, furnish the necessary management, labor, facilities, materials, and equipment (except as specified to be furnished by the Government) and do all things required to provide flight hardware and materials for all procurement effort and issuance of Purchase Agreements to subcontractors for the Sixth Buy Flight Hardware as expressly provided below:

- 1) The contractor shall procure Flight Hardware and materials as identified in the Bill of Material submitted with Contractor's Proposal ECP-B02027 Phase I – Longest of Long Lead Sixth Buy Flight Hardware submitted by Lockheed Martin Letter 97MO-0574, dated August 1, 1997, and authorized by Supplemental Agreements 432, 449, 474, and 493 to this contract and Proposal PCP-B81422 Phase II – Ten (10) Ship sets of External Tank Sheet and Plate submitted by Lockheed Martin Letter 97MO-0753 dated September 24, 1997 and authorized by Supplemental Agreements 444, 473, and 494 to this contract and Proposal PCP B81447 Phase III Balance of Flight Hardware and Material for Sixty Ship Sets of Super Lightweight External Tanks; Submitted by Lockheed Martin Letter 99M0-0777, dated August 13, 1998 and authorized by Supplemental Agreement 512 to this Contract.
- 2) The ET delivery schedule to be supported by this Attachment J-19 procurement of Sixth Buy Flight Hardware/materials is specified in accordance with POP 98-1 as follows:

FY01	1 deliveries
FY02	8 deliveries
FY03	8 deliveries
FY04	8 deliveries
FY05	8 deliveries
FY06	8 deliveries
FY07	8 deliveries
FY08	8 deliveries
FY09	3 deliveries
Total	60 deliveries

In addition to procuring Buy 6 flight hardware to meet the above identified delivery rate, the contractor is authorized but not required to procure preferrals of up to four shipsets of flight hardware. All preferrals shall be accommodated within the total contract requirement.

- 3) The contractor shall perform related effort required in conjunction with the procurement of Buy 6 materials/effort and issuance of Purchase Agreements to subcontractors in support of the delivery schedule shown above.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

B. It is understood and agreed that the scope of work contained herein on Attachment 19 is stated in broad terms in order to achieve maximum required flexibility. The contractor's obligation under said Attachment 19 may include resolution of unusual or emergency situations that may occur from time to time throughout the period of performance. However, if any written direction by the Government is considered by the contractor to be outside the scope of the contractor's contractual obligation under this Attachment, the contractor, before performing any effort pursuant to such Government direction, shall refer such questions to the Contracting Officer for resolution.

C. The period of performance for Attachment J-19 is September 16, 1997 through September 30, 2009.

D. All other provisions of Contract NAS8-36200 are applicable to this Attachment. Subcontractor required Flow Down FAR and NASA FAR Supplement Clauses identified in Section I, will be to the latest revision through September 1997.

**Attachment J-19 deactivated and transferred to Contract NAS8-00016 under Mod 577**

**SECTION D**

**SMALL AND SMALL DISADVANTAGED BUSINESS PLAN**

A. The Small and Small Disadvantaged Business Plan for this Attachment J-19 is the plan contained in Attachment J-3 of this contract. The plan is hereby modified to contain the Small and Small Disadvantaged Business Goals as presented in paragraph B. below.

B. For this Attachment J-19-Procurement of Buy 6 Flight Hardware after the first incentive period, goals for subcontracting with Small and Small Disadvantaged Business concerns are identified by Fiscal Year(GFY) or half year (GFY/2) based on the calculation as identified in B.(1)a. for Small Business and B.(2)a. for Small Disadvantaged Business of this Attachment:

Cumulative Subcontract Goals	
Small Business	Small Disadvantaged Business

Inception thru FY 99

1 <sup>st</sup> Half FY 2000		
2 <sup>nd</sup> Half FY 2000		
1 <sup>st</sup> Half FY 2001		
2 <sup>nd</sup> Half FY 2001		
1 <sup>st</sup> Half FY 2002		
2 <sup>nd</sup> Half FY 2002		
1 <sup>st</sup> Half FY 2003		
2 <sup>nd</sup> Half FY 2003		
1 <sup>st</sup> Half FY 2004		
2 <sup>nd</sup> Half FY 2004		
1 <sup>st</sup> Half FY 2005		
2 <sup>nd</sup> Half FY 2005		
1 <sup>st</sup> Half FY 2006		
2 <sup>nd</sup> Half FY 2006		
1 <sup>st</sup> Half FY 2007		
2 <sup>nd</sup> Half FY 2007		
1 <sup>st</sup> Half FY 2008		
2 <sup>nd</sup> Half FY 2008		
1 <sup>st</sup> Half FY 2009		
2 <sup>nd</sup> Half FY 2009		

(b)(4)

(b)(4)

ATTACHMENT J-20

NATIONAL CENTER FOR ADVANCED MANUFACTURING (NCAM)

The work-scopes for all phases of the NCAM effort shall be implemented by this Attachment. The effort described below is a task by task listing along with a description of each task that has been identified to support the NCAM. It specifically excludes any effort associated with the NCAM operations. Additional tasks may be included, subject to separate contractual action, as they become necessary.

The contractor will obtain approval from the MAF Resident Office prior to implementing any physical modifications to the facility for the tasks described below.

Task 1: The Contractor shall provide support to the installation of the sixteen foot Fiber Placement Machine (FPM) at MAF for NASA's National Center for Advanced Manufacturing in accordance with Project Change Proposal B90331. These support tasks include planning; supervision of equipment and performance checkout; and preparation of maintenance requirements and equipment procedures.

Task 2: Renovate Building 420's entrance and 2<sup>nd</sup> floor to support UNO office and classroom requirements relative to NCAM Phase I (a) in accordance with Project Change Proposal B81511.

**MEMORANDUM OF DECISION UNDER PUBLIC LAW 85-804**

**Lockheed Martin Michoud Space Systems (LMMSS)**

Pursuant to Public Law 85-804, Executive Order 10789, as amended, and subject to the provisions of the "Memorandum Decision Under Public Law 85-804" dated September 26, 1984, I hereby authorize (by inclusion of an appropriate indemnification provision into Contract NAS8-36200 (NASA Federal Acquisition Regulation Supplement 1852.250-70 (September 1989) Alternate I (March 1989))) LMMSS to be held harmless and indemnified against certain unusually hazardous risks as defined below.

Contract NAS8-36200 is the Fifth Production Buy of External Tanks (ETs) for use with the Space Shuttle. The ET is a major component of the Space Transportation System (STS). The contractor is required to manufacture and deliver ETs, which are certified for human space flight. The ET effort is performed at the Michoud Assembly Facility (MAF) in New Orleans, Louisiana and Kennedy Space Center in Florida. The contract was awarded on June 7, 1988, and contained the appropriate Federal Acquisition Regulation (FAR) and NASA FAR Supplement indemnification clauses. However, specific approval for this contract as required by paragraph 9 of the 1984 Memorandum Decision was never obtained. As a result, this memo provides the required approval.

NASA and LMMSS have agreed to the following definition of unusually hazardous risks:

"The unusually hazardous risks associated with the External Tank for which indemnification is authorized are risks arising from or in connection with the burning, explosion, or detonation of Space Transportation System (STS) flight elements or components, including (but not limited to) the External Tank or ground support equipment; uncontrolled or accidental releases or spills of hazardous chemicals or gases; and the landfall of STS or elements, components, or fragments thereof; any or all of which may result in liability for personal injury or death, loss of or damage to property, or loss of use of property. The risk period begins solely when such products or services are provided to the U.S. Government installation for or in connection with one or more shuttle launches, and products are actually used or services actually performed in connection with NASA's space activities. These risks are considered unusually hazardous in the sense that the potential occurrence of such risks may result in a catastrophic accident with potential liability that could be substantially in excess of the insurance coverage NASA contractors could reasonably be expected to purchase and maintain, considering the availability, cost, terms and conditions of such insurance."

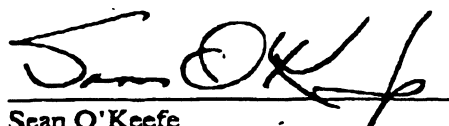
I have reviewed the financial protection program to be maintained by LMMSS. Mr. Bradley P. Cartwright, Director of Contracts and Estimating forwarded this program to NASA for LMMSS's Michoud Operations, on May 24, 2002, attached hereto and further

supplemented same on May 29, 2002. This letter identifies insurance policies with liability coverage in the amount of \$2 billion and expiration dates of midnight (local time around the world) on May 31, 2002. In the information submitted by Mr. Cartwright on May 29, 2002, LMMSS advised that it could only obtain liability coverage of \$1.5 billion effective June 1, 2002. The requested indemnification is for liability for general losses which may occur in excess of LMMSS's \$2 billion current financial protection through midnight (local time around the world) May 31, 2002, and in excess of \$1.5 billion beginning after the expiration of the \$2 billion coverage, unless compensated for by insurance or otherwise. Based on my review of the submitted description of coverage, LMMSS's financial protection program appears to be adequate.

Therefore, based on the information provided by LMMSS, I hereby authorize indemnification of LMMSS for coverage above the current insurance addressed in their May 24, 2002, letter (coverage through May 31, 2002) and May 29, 2002 letter (coverage beginning June 1, 2002). If insurance coverage or other financial protection in effect on the date of this Memorandum of Decision is reduced or does not exist for any reason, the Government's obligation to provide indemnification above \$2 billion through midnight (local time around the world) May 31, 2002, or \$1.5 billion thereafter, shall not change. Further, this approval is granted on the condition that LMMSS maintains their financial protection program currently in place through May 31, 2002, and as modified as of June 1, 2002.

The cognizant NASA Contracting Officers, at their discretion, may authorize the indemnification of LMMSS subcontractor, at any tier, above a reasonable amount of insurance maintained by the subcontractor, although less than maintained by LMMSS.

I find that this action will facilitate the national defense. The potential liability that could result from the remote event that products resulting from this effort malfunctioned causing damage in excess of insurance maintained by LMMSS and its subcontractors would deter this, or any other company, from providing such supplies and services to NASA for use in the shuttle program. The continued operation of the Shuttle is an essential space activity in support of national defense programs. I note that, for purposes of the Defense Production Act of 1950, the term "national defense" is defined as "programs for...space and directly related activity" (50 U.S.C. App.2152(d)).



Sean O'Keefe  
Administrator  
National Aeronautics and  
Space Administration

May 30, 2002  
Date

MEMORANDUM DECISION UNDER PUBLIC LAW 85-804

Authority for National Aeronautics and Space Administration Contracting Officers to indemnify certain NASA contractors and subcontractors involved in NASA space activities.

1. On July 4, 1982, the Space Transportation System (hereinafter STS) completed its design, development, test and evaluation phase and was declared an operational system of the United States for the transportation of payloads into and out of outer space for governmental and commercial purposes. With the commencement of these space operations, the STS has conducted and will continue to conduct launch, in orbit and landing activities on a repetitive basis and at an increasing frequency.
2. Scheduled STS operations at an increasing frequency has dictated a continuing examination of the risks in repetitive space activities of the STS and the present availability of adequate insurance at reasonable premiums to manufacturers and operators of the system. While NASA's STS space activities are designed to be safe, and have been proven to be safe, there exists the remote and low statistical probability that a malfunction of either hardware, software or operator error could occur resulting in an accident. This low probability of occurrence, albeit remote, cannot be totally removed. In the event that such a malfunction or operator error led to an accident, the potential liability arising from such an accident could be substantially in excess of the insurance coverage NASA contractors could reasonably be expected to acquire and maintain considering the availability, cost and potential terms and conditions of such insurance at the present time.
3. Pursuant to the authority of Public Law 85-804 and Executive Order 10789, as amended, and notwithstanding any other provisions of the contracts to which this determination may apply, I therefore authorize that certain NASA contractors, as further defined in paragraphs 4 and 5 below, be held harmless and indemnified against certain risks as specifically set forth herein. Accordingly, and subject to the limitations hereinafter stated, cognizant NASA contracting

Officers are authorized to include in prime contracts, described in paragraphs 4 and 5 below, contract provisions for the indemnification of the contractors and their subcontractors at any tier, against claims or losses, as defined in paragraph 1A of E.O. 10789, as amended, arising out of contract performance directly related to NASA's space activities.

4. This authorization is limited to prime contracts which have an effective date before October 1, 1989, by or for NASA for:

- a. provision of Space Transportation System and cargo flight elements or components thereof;
- b. provision of Space Transportation System and cargo ground support equipment or components thereof;
- c. provision of Space Transportation System and cargo ground control facilities and services for their operation; and
- d. repair, modification, overhaul support and services and other support and services directly relating to the Space Transportation System, its cargo and other elements used in NASA's space activities.

5. This authorization is further limited solely to claims or losses resulting from or arising out of the use or performance of the products or services described in paragraph 4 in NASA's space activities. For this purpose, the use or performance of such products or services in NASA's space activities begins solely when such products or services are provided to the U.S. Government at a U.S. Government installation for or in connection with one or more Space Transportation System launches and are actually used or performed in NASA's space activities.

6. The risks for which indemnification is authorized are the risks arising under the contracts described in paragraph 4 and 5 causing personal injury or death, or loss of or damage to property, or loss of use of property. These risks are considered unusually hazardous risks solely in the sense that if, in the unlikely event, the Space Transportation System, its cargo or other elements or services used in the NASA's space activities malfunctioned causing an accident, the potential liability could be in excess of the insurance coverage that a NASA prime contractor would reasonably be expected to purchase and maintain, considering the availability, cost and terms and conditions of such insurance.

In no other sense are the Space Transportation System, its cargo or other elements or services used in NASA's space activities unusually harzardous.

7. a. This authorization may be applied prospectively, without additional consideration, to existing prime contracts and subcontracts and in new prime contracts and subcontracts which otherwise meet the conditions of this memorandum.

b. Indemnification of prime contractors and subcontractors may be provided under this authorization only when the Government will receive the benefit of all cost savings, if any, to the prime contractor and its subcontractors at every tier.

8. All contract indemnification clauses shall comply with applicable provisions of Federal Acquisition Regulation 50.4 as modified by the NASA FAR Supplement 18-50.4.

9. This authorization is given upon condition that each prime contractor is approved by me and that such contractor maintains financial protection of such type and in such amounts as may be determined by me in writing to be appropriate under the circumstances. Each prime contractor shall provide a statement of applicable financial protection through the cognizant NASA contracting officer for my review and determination. In making this determination, I shall take into account such factors as the availability, cost and terms of private insurance, self-insurance and other proof of financial responsibility and workman's compensation insurance.

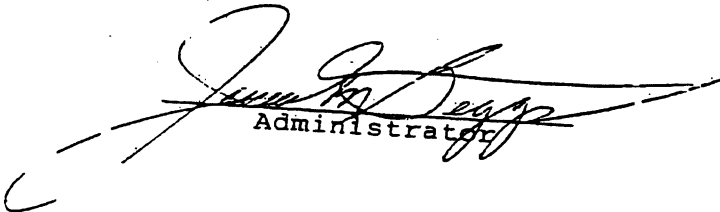
10. When indemnification provisions are included in a prime contract pursuant to the authority of this decision, the cognizant Contracting Officer shall immediately submit directly to the Contract Adjustment Board a report referencing this decision and containing the information required by NASA/FAR Supplement 18-50.403-70-Reporting and records requirements.

11. The actual or potential cost, if any, of the actions hereby authorized is impossible to estimate since it is contingent upon the remote possibility of an occurrence and extent of loss resulting from certain space activities which malfunction. Such an event may never occur; however, should a major incident occur, millions of dollars of damage could result.

12. I find that this action will facilitate the national defense. In the remote event that the Space Transportation System, its cargo or other elements or services used in NASA's space activities malfunctioned causing damage in excess of insurance maintained by contractors and subcontractors, the resulting excess liability could place the contractors and subcontractors continued existence in jeopardy, making those contractors and subcontractors unavailable to continue to support space activities and the Department of Defense. I note that for purposes of the Defense Production Act of 1950, the term national defense is defined as "programs for ... space, and directly related activity." (50 U.S.C. App. 2152(d)).

9/26/84

Date

  
Administrator

J-21-6